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No. 85

ROK Research Institutes

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KOREAN AFFAIRS REPORT

No. 85

ROK RESEARCH INSTITUTES

Tokyo KAGAKU GIJUTSU CHOSA [Science and Technology Investigation Report] in Japanese No 81, Nov 78 pp 53-100

[This report, published by the Planning Bureau of the Science and Technology Agency, is based on a Japanese scientists group fact-finding trip to South Korea from 7-12 March 1978. The Foreword, Part 1 on S&T programs in the Philippines, and Part 3 on R&D cooperative efforts of the Japanese Government, university and private sector have not been translated. Numbers and captions for the graphs and charts have been added by JPRS.]

[Text] I. Overall Trends

A. Direction of Science and Technology Policies

1. Science and technology are considered indispensable to the development of this country and their policies are closely related to economic development plans.

The economic development of the Republic of Korea [ROK] has suddenly shown tremendous progress in recent years. During the third 5-year economic development plan (1972-1976), following the oil crisis of 1973, a high standard of 11.2 percent average economic growth per year was maintained. To provide scientific and technical [S&T] support to this economic development, the third 5-year S&T development plan (1972-1976) established the following goals: (1) to lay a firm S&T foundation and to strengthen it through progress in knowledge and skills; (2) to support heavy and chemical [chemo-heavy] industries through advance of strategic industrial technology; and (3) to nurture scientifically-inclined attitudes of the general populace and create a favorable S&T environment. This form of S&T advancement, with emphasis on industrial technology, contributed greatly to the economic progress of this country.

With the realization it outgrew the level of a developing nation in the 1960s and established its position in the upper ranks of semi-advanced countries in the 1970s, the ROK is striving even greater for economic independence. With the

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goal of 10 billion dollars in exports and per capita income of 1,000 dollars, the fourth 5-year S&T plan (1977-1981) is aimed at developing a high-level industrial society with chemo-heavy industries as the focal point, and the ROK is strongly promoting S&T activities to attain the level of an advanced industrial country during the early 1980s. The basic policy goals are as follows:

(1) To strengthen the foundation of S&T development and the independent power to develop S&T through improvements in the quality of S&T personnel and increasing its research and development [R&D] capabilities.

(2) Aggressive guidance in economic advancement through strategic development of sophisticated industrial technologies, priority fostering of think tank industries, promotion of technological revolutions, etc.

(3) Application of science in the people's lives, national diffusion of S&T awareness and nurturing of S&T customs and habits.

In addition, the following items have been designated as reinforcing forces for national development:

(1) Increase awareness of the importance of S&T; (2) cultivate outstanding human potentials; (3) organize the setup for S&T development and promote its strategic development; (4) lay the foundation under government leadership and advancing technological development with the contribution of commercial enterprises; and (5) promote import of advanced technologies and parallel advancement of independent technological growth.

Furthermore, with 1980 as the goal, the following concrete measures have been planned for S&T development strategy:

(1) Attain advanced S&T capabilities of international level.

(a) Expand the Korea Advanced Institute of Science [KAIS]; (b) strengthen the educational programs of science and engineering graduate schools; (c) advance basic research in universities; (d) induce the use of overseas Korean scientists; and (e) establish and operate technological universities.

(2) Formation of nation-wide setup for technological development.

(a) Conversion to technological development setup under the guidance of commercial enterprises; (b) utilization of research capabilities of universities (specific goal is basic research); and (c) establishment of comprehensive R&D setup--select the Korea Institute of Science & Technology [KIST] as the nucleus, establish 10 specialized industrial research agencies and obtain the cooperation of governmental and private research institutes; (d) priority development of think tank industries (precision machineries, precision chemical and electronics industries, software, engineering, information industries, etc.); (e) liberalization, by stages, of technological imports; and (f) improvment of capability to utilize technology (particularly industrial plant technology).

(3) Diffusion of S&T Throughout the Country

(a) Cultivate S&T thoughts; (b) give technological support to saemaul work; and (c) increase farmers' income and develop regional communities.

2. Regarding the highlights of ROK's S&T policies, the explanation given by Minister Ch'oe of the Ministry of Science & Technology [MOST] can be summarized as follows:

(1) The ROK has its own distinctive technology from ancient days but the promotion of modern S&T is a recent event, and its systematic development began with the first economic development plan of the 1960s. In the ROK there is limited time for national development, and for this reason, what is important is not education in itself but the purposes for which education is to be used, Therefore, the basis of ROK's S&T policy is to determine in what manner S&T should contribute to national development. Furthermore, in the past 10 years or so, S&T supported economic growth but in the future, it is believed that S&T will have to lead economic growth.

(2) An important policy matter is the recruitment of personnel. For this purpose graduate schools were established to train excellent researchers. The aim in setting up graduate schools is to secure qualified personnel so that for a backward country like the ROK, the timing will not be lost when opportunities are ripe for economic advancement. Also, the aim is to train suitable technicians for the industrial development of the ROK. Under the present university system, there is no flexibility and there are cases where supply cannot meet the demand so this graduate school has been placed under the jurisdiction of the MOST.

Furthermore, students of this graduate school have been given the special privilege of exemption from military service, and to gather outstanding educators, nationality has not been considered in selecting professors.

(3) In the area of recruiting adequate S&T personnel, technical schools have been established to give graduates qualifications comparable to those given to university graduates because a lack of capable technicians will cause an imbalance in the [scientific] advancement.

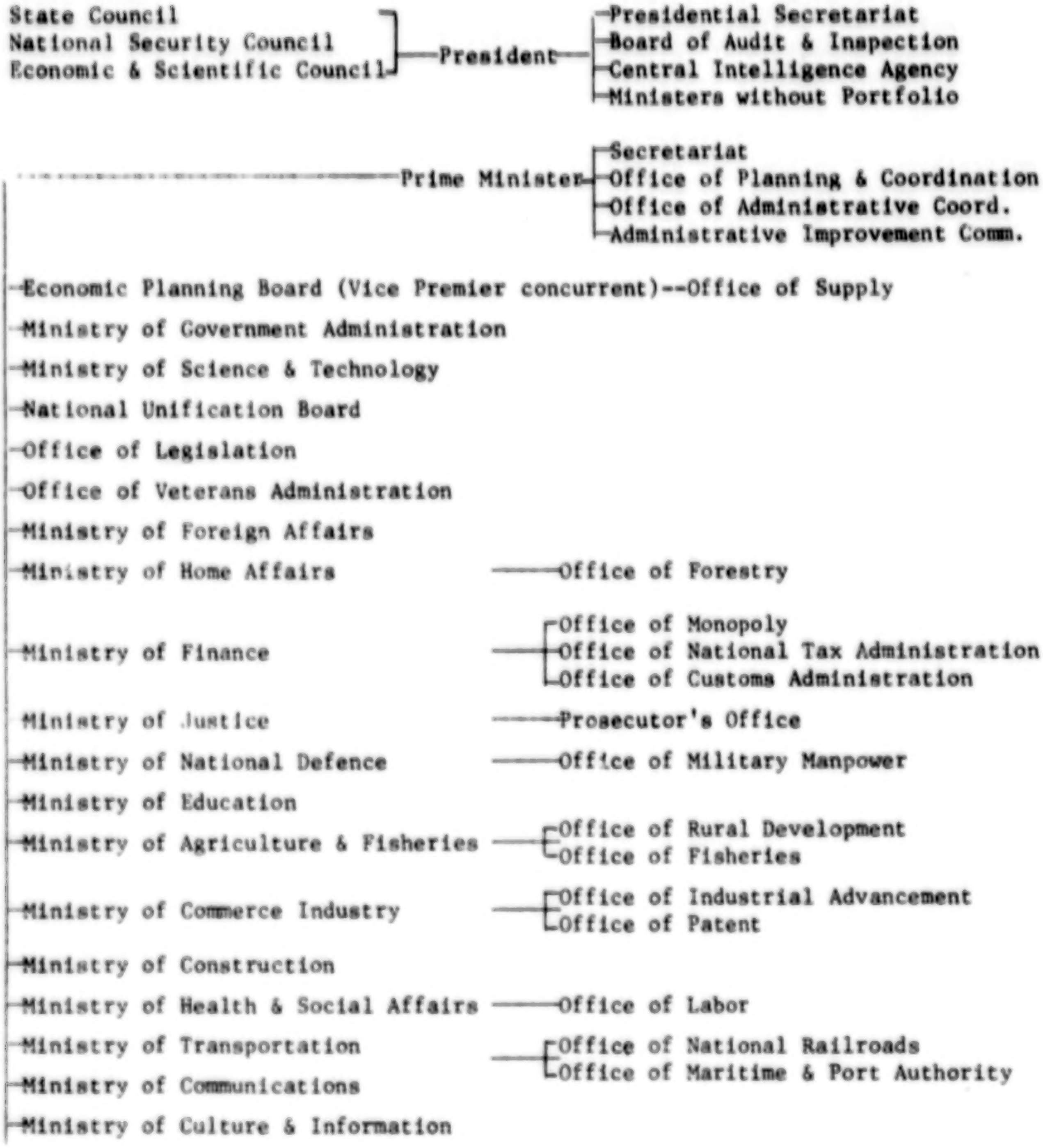
The aim in establishing technical schools is to give social status to technicians, whose status is low, and because in industrialization 85 percent of the personnel must be technicians, their improvement in skill is considered indispensable. This system was patterned after the National Australia University.

B. S&T Administrative and Research Setup

1. In the ROK, administration is carried out according to the following setup under the President who is head of state as well as administrative chief [Figure 1].

Figure 1

[S&T Administrative Setup]



- State Council
- National Security Council
- Economic & Scientific Council
- President
  - Presidential Secretariat
  - Board of Audit & Inspection
  - Central Intelligence Agency
  - Ministers without Portfolio
- Prime Minister
  - Secretariat
  - Office of Planning & Coordination
  - Office of Administrative Coord.
  - Administrative Improvement Comm.
  - Economic Planning Board (Vice Premier concurrent)--Office of Supply
  - Ministry of Government Administration
  - Ministry of Science & Technology
  - National Unification Board
  - Office of Legislation
  - Office of Veterans Administration
  - Ministry of Foreign Affairs
  - Ministry of Home Affairs
    - Office of Forestry
  - Ministry of Finance
    - Office of Monopoly
    - Office of National Tax Administration
    - Office of Customs Administration
  - Ministry of Justice
    - Prosecutor's Office
  - Ministry of National Defence
    - Office of Military Manpower
  - Ministry of Education
  - Ministry of Agriculture & Fisheries
    - Office of Rural Development
    - Office of Fisheries
  - Ministry of Commerce Industry
    - Office of Industrial Advancement
    - Office of Patent
  - Ministry of Construction
  - Ministry of Health & Social Affairs
    - Office of Labor
  - Ministry of Transportation
    - Office of National Railroads
    - Office of Maritime & Port Authority
  - Ministry of Communications
  - Ministry of Culture & Information

The reason why other agencies are designated with the character "bu" [TC 0223] and the Ministry of Science & Technology is designated with the character "sho" [TC 5710] is because with the approval of the prime minister, the MOST can function as a coordinating body with influence on other ministers.

Administrative responsibility lies with the president and the prime minister is his assistant. Thus, for example, if there is conflict between the S&T promotion plan and another plan, the problem is first taken up by the prime minister but the final decision is made by the president.

Cabinet and cabinet-level economic meetings are held twice a week to take up significant proposals. There are no parliamentary vice ministers in the various administrative organs but there are permanent vice ministers who hold vice ministers' meetings which actually rule on proposals before they are referred to the cabinet.

2. Ministry of Science and Technology

a. S&T-related officials are attached to various administrative organs but the MOST is the overall coordinating agency.

The MOST was established in 1967 under the direct jurisdiction of the prime minister. This agency grew from the then Economic Planning Board.

The mission of the MOST includes the formulation of basic policies concerning S&T, coordination and integration of S&T plans, technical cooperation with international organs and foreign countries, development uses of atomic energy, coordination with various agencies concerning S&T plans, etc.

As mentioned earlier, the chief function of the MOST is the formulation of S&T policies but these policies are first taken up in the concerned committees and discussed with appropriate ministries, and the particularly significant policies are decided upon after deliberation by the National Committee for Science & Technology.

The MOST also has the power of overall coordination for S&T-related budget. Budget formulation power rests with the Economic Planning Board [EPB] but prior to the submission of the budget requests to the EPB by the concerned agencies, the MOST sends out directions to these agencies which follow them in presenting their plans to the MOST. The contents are coordinated by the MOST prior to submission to the EPB for use in budget planning.

As far as the planning procedures are concerned, there is the aforementioned 5-year [S&T] plan which is a ministry plan within the national economic development plan. The S&T plan is formulated to conform to the goals set by the EPB and is approved after deliberation by the Committee for the Development of Science & Technology. Members of the Korea Institute of Science and Technology [KIST], in particular, are engaged in this operational phase.

This S&T plan is not targetted against the entire S&T field but against the fields under the jurisdiction of the MOST. Thus, the Ministry of Agriculture & Fisheries formulates parallel plans for agricultural matters.

b. Following are the principal deliberation councils related to S&T matters:

(1) Economic and Scientific Council

This is an advisory organ for the President. It was extremely active, at the time of establishment, but it does not directly possess an investigative body. However, from the non-governmental committee members, worthwhile suggestions have evolved and during the oil crisis, this council actively formulated counter measures and produced effective results.

(2) National Committee for Science & Technology [NCS&T]

Possesses practically the same functions as the Council for Science & Technology of Japan. However, there are no standing members. The prime minister is the chairman, and members consist of the heads of the EPB and ministries of Home Affairs, Finance, National Defence, Education, Agriculture & Fisheries, Commerce & Industry, Health & Social Affairs, Transportation, Communications, and Science & Technology. Others include cabinet council members appointed by the prime minister and three non-governmental persons recommended by the prime minister.

The NCS&T deliberates on the following matters:

(a) Formulation of comprehensive policies concerning S&T promotion and coordination of important S&T policies; (b) overall coordination of the budget to promote S&T; (c) selection of significant national projects; (d) coordination of comprehensive plans to develop personnel and important policies related to these plans; (e) development and operation of a system for S&T qualifications; (f) coordination and maintenance of S&T agreements, technological and resources development; (g) mass education; and (h) other important matters concerning S&T promotion.

(3) Committee for the Development of Science & Technology [CDS&T]

Composed of the Minister of Science & Technology as the chairman and members, not to exceed 12, certified by the said minister.

The CDS&T is responsible for the following matters:

(a) Drafting of long-range, comprehensive plans to promote S&T; (b) formulation of S&T budget; and (c) other matters considered important by the minister. This committee is comprised of 14 subcommittees, including agriculture and forestry and social sciences, and specialists can be appointed as members. Furthermore, the KIST participates as a think tank in the deliberations of this committee. If the KIST researchers cannot handle any assignment, it might be contracted out to other researchers for a period of 1 month to half a year.

c. Other Government Organs

Ministries and test and research organs, specially related to S&T, and their duties are shown in [Table 1].

[Table 1.]

Ministries	Test & Research Organs	Duties
Ministry of Science and Technology	Central Meteorological Office	Weather service and industrial meteorology
	National Science Museum	Demonstration and popularization of science and technology
	*Korea Institute of Science and Technology	Overall research and development of science and technology and industrial economics
	*Korea Atomic Energy Research Institute	Research and development of atomic and other energy sources, and R & D in environmental problems
Ministry of Home Affairs	National Institute of Science Investigation	Judgement of evidence and technical criminal research
(Office of Forestry)	Institute of Forest Genetics	Breeding, forest genetics, and new seeds
	Forest Research Institute	Forest management, afforestation, protection of forests, utilization of wood and inspection of forest products
	Forest Resources Survey and Research Centre	Forest status and forest soil surveying
Ministry of Finance (Office of National Tax Administration)	Technical Research Institute of National Tax Administration	Brewing and distilling techniques and facilities, analysis and investigation of taxable goods

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* Non Governmental organs

[Table 1.(Continued)]

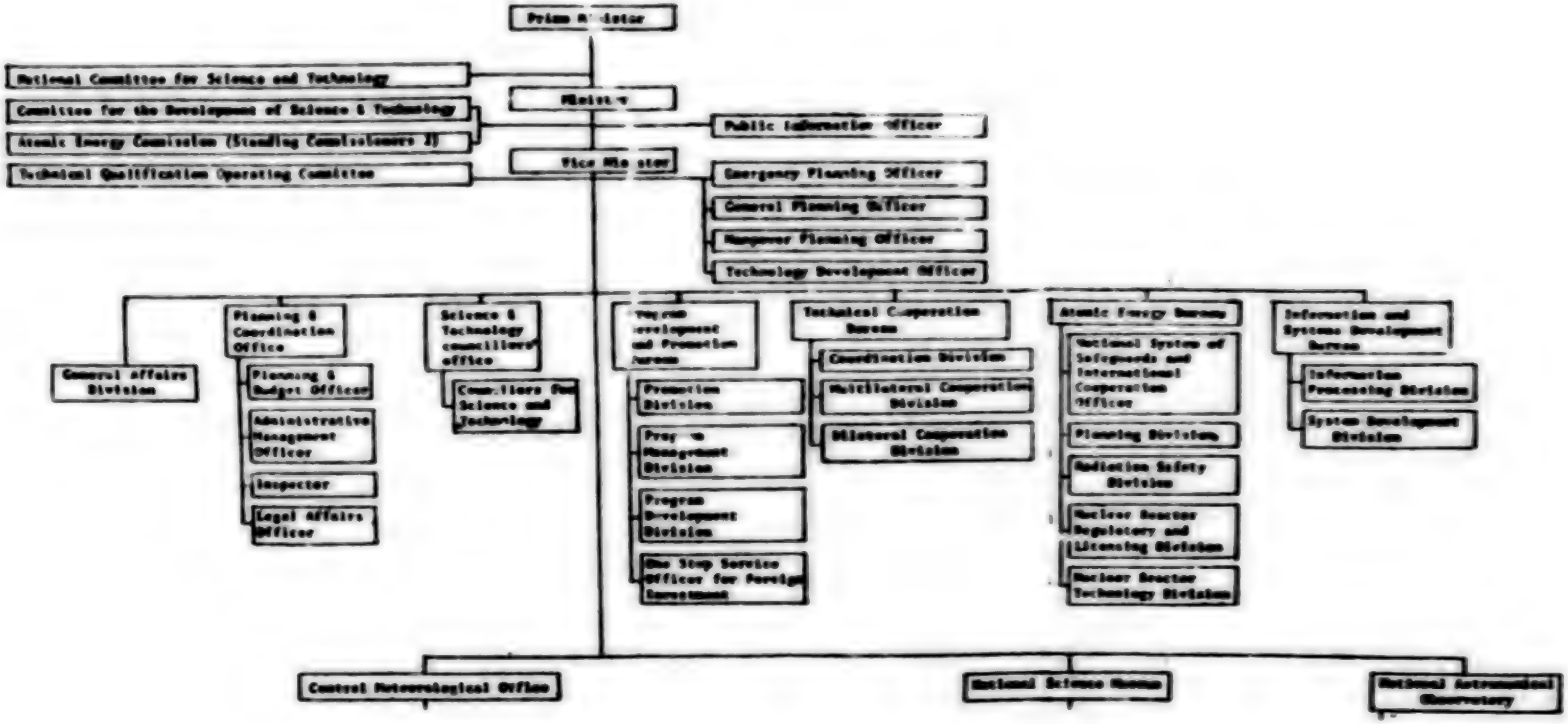
(Office of Monopoly)	Central Research Institute, Office of Monopoly	Quality improvement for tobacco and ginseng, product expansion
Ministry of Agriculture and Fisheries	Agriculture Economics Research Institute	Agricultural productivity, agricultural structure, use of land, agricultural product marketing
	Institute of Agricultural Engineering and Utilization	Improvement of farm implements, agricultural engineering, storage and processing of agricultural products
(Office of Rural Development)	Institute of Agricultural Science	Fertilizers, agricultural chemicals, plant and soil pathology, entomology and mushroom research
	Crop Experiment Station	Rice cultivation, upland crops and special crops
	Honam (Yŭngnam) Crop Experiment Station	Rice cultivations, upland crops and special regional crops
	Horticultural Experiment Station	Vegetable and fruit breeding, cultivation improvement
	Sericulture Experiment Station	Sericulture and silkworms
	Livestock Experiment Station	Method improvement for livestock and poultry breeding
	Institute of Veterinary Research	Livestock and poultry diseases, livestock product inspection

[Table 1, (Continued)]

	Alpine Experiment Station	Alpine crops and livestock
	Cheju Experiment Station	Regional alpine crops and livestock
(Office of Fisheries)	National Fisheries Research and Development Agency	Fisheries research and development, extension services
	Central Fishery Products Inspection Station	Aquatic product inspection, aquatic product technical services and packaging
Ministry of Commerce and Industry	National Industrial Standards Research Institute	Technical services for industry and industrial materials, industrial product inspection
(Industry Advancement Administration)	Geological and Mineral Institute of Korea	Geology, underground and sea bed resources
Ministry of Construction	National Construction Research Institute	Standardization and R & D for civil engineering, including cartography
Ministry of Health and Social Affairs	National Institute of Health	Drug product and food quality control
	National Medicial Centre	Less known diseases
Ministry of Transportation	Hydrographic Office	Waterways, international waterway information exchange
(Office of Railroads)	Railroad Technical Research Institute	Rails, freight, fuel, electronic communication and operation
Ministry of Communications	Electrical and Communications Laboratory	Telecommunication techniques and communication equipment
	Radio Research Laboratory	Wave and ionosphere wireless communication facilities

[Table 2.]

Organization Setup of Ministry of Science & Technology


Prime Minister
National Committee for Science and Technology
Minister
Committee for the Development of Science & Technology
Atomic Energy Commission (Standing Commissioners 2)
Public Information Officer
Vice Minister
Technical Qualification Operating Committee
Emergency Planning Officer
General Planning Officer
Manpower Planning Officer
Technology Development Officer
General Affairs Division
Planning & Coordination Office
Planning & Budget Officer
Administrative Management Officer
Inspector
Legal Affairs Officer
Science & Technology councillors' office
Councillors for Science and Technology
Program Development and Promotion Bureau
Promotion Division
Program Management Division
Program Development Division
One Stop Service Officer for Foreign Investment
Technical Cooperation Bureau
Coordination Division
Multilateral Cooperation Division
Bilateral Cooperation Division
Atomic Energy Bureau
National System of Safeguards and International Cooperation Officer
Planning Division
Radiation Safety Division
Nuclear Reactor Regulatory and Licensing Division
Nuclear Reactor Technology Division
Information and Systems Development Bureau
Information Processing Division
System Development Division
Central Meteorological Office
National Science Museum
National Astronomical Observatory

3. Juridical Foundations

In the ROK, there are influential research organs and S&T-related organs which are receiving special subsidies from the government. These organs are organized as juridical foundations in accordance with special laws (they are somewhat different in setup from Japanese foundations).

A typical example is the KIST which has greatly contributed to the S&T development of the ROK. Similar examples are the afore-mentioned KAIS, which is a university graduate school, and the Korea Scientific & Technological Information Center [KORSTIC]. These organizations are placed under the supervision of the MOST.

When state-operated research organs rely wholly on government budget, they sometimes lack flexibility in their operations. Therefore, this measure was taken to enable autonomous and highly flexible research activities.

The revenue sources are the establishment fund and government subsidy. The founders is the president and the first executive director is appointed by the president. Research contracts from the government and commercial enterprises constitute the bulk of its work, and because operational autonomy is strong, research evaluations are all the more stringent.

As the economy expands, the demand for industrial technology rapidly increases and the functional capability of the KIST alone is not sufficient. To meet the demand and augment the KIST, the government is establishing specialized research organs, particularly in the important field of chemo-heavy industries. Presently, the following 10 organs are being established [Table 3].

[Table 3]

Location	Research Institutes	Construction Period 1st Phase
Daeduk [Taedok]	Korea Standard Research Institute	1975 - 1978
	Korea Research Institute of Ship & Ocean	1976 - 1980
	Korea Nuclear Fuel Development Institute	1976 - 1981
	Korea Chemical Research Institute	1976 - 1978
	Korea Energy Conservation & Monitoring Institute	1977 - 1979
	Korea Telecommunication Research Institute	1977 - 1979
	Korea Institute of Geoscience & Mineral Resources	1976 - 1978
Ch'angwon	Machinery Metals Test Laboratory	1976 - 1979
	Electric Equipment Test Laboratory	1976 - 1979
Kumi	Electronics Technology Research Institute	1976 - 1981

C. Concrete Policies

1. S&T Investments, Etc.

The 4th phase of the 5-year S&T development plan calls for S&T investment goals as shown in the following table [Table 4]. Presently, the investment ratio is 70 percent for the government and 30 percent for non-governmental sources and the distinguishing feature of the plan is the aim to increase non-governmental investment to 50 percent after 5 years. The objective is to gradually shift the image to that of an advanced industrial country where non-governmental research activities are actively carried out.

There is a high probability that this goal will be attained since non-governmental investments are proceeding smoothly.

The investment ratio to GNP is expected to practically double in the next 5 years. It is said that this investment goal was calculated on the basis of past rate trends and examples of various advanced countries.

Furthermore, as to long-range plans, the Long-range Economic Society Outlook (Korea Development Institute) expects that in 1991, the S&T investment ratio to GNP will be 2.5 percent and the ratio between government and non-governmental investments will be 40 : 60.

[Table 4]

S&T Investment Plan

(Unit: 1 billion won)

Year Item	1977	1978	1979	1980	1981	1977 (results)
GNP	11,486.6	12,520.4	13,637.3	14,875.5	16,214.3	12,143
S&T Investments	79.6	112.7	136.4	193.4	243.2	70.1
Government	55.5	73.3	81.9	106.4	121.6	48.6
Non-government	24.1	39.4	54.5	87.0	121.6	21.4
Government : Non-government	70 : 30	65 : 35	60 : 40	55 : 45	50 : 50	70 : 30
GNP ratio (Percentage)	0.7	0.9	1.0	1.3	1.5	0.6

The government budget is shown chronologically in the following table [Table 5]. The ratio of S&T budget to the total government budget is not very high. The ROK fiscal year is from January to December.

[Table 5]

Item Year	Total Gov't Budget (A) 1 million won	S&T-related Budget (B) 1 million won	B/A (%)
1972	709,336	10,454	1.5
1973	659,376	11,040	1.7
1974	1,038,256	30,199	2.9
1975	1,586,931	35,050	2.2
1976	2,258,512	48,646	2.2
1977	2,869,956	58,009	2.0
1978	3,517,037	69,751	2.0

The economic goals of the 4th phase 5-year economic development plan are shown below [Table 6].

[Table 6]

Economic Scale

	Unit		1975 (A)	1981 (B)	Increase (B/A)	1977-81 Average Yearly Increase (%)
GNP	1975 prices	1 bil. won	9,080	16,214	1.8	9.2
	1975 prices	1 billion dollars	18.8	33.5	1.8	9.2
	Normal prices	"	18.8	58.7	-	-
Population	1 million persons		35.3	38.8	1.1	1.6
Per Capita	1972 prices	1 thous. won	257	418	1.6	7.6
GNP	Normal prices	Dollars	532	1,512	-	-
Products Exports	1975 prices	1 billion dollars	5.0	14.2	2.8	16.0
	Normal prices	"	5.0	20.2		21.8
Products Imports	1975 prices	1 billion dollars	6.6	13.8	2.0	12.0
	Normal prices	"	6.6	18.8		18.7

2. Enlarging the S&T Base

a. Personnel Development

The ROK S&T policies place the heaviest emphasis on personnel development. The basic goals are to establish a system to turn out high-level S&T personnel in large numbers and to maintain and improve the technical standards of technicians.

Personnel development plans are to turn out, in 1975, 60,000 S&T personnel, 80,000 on-site technicians and 950,000 technicians, for a total of 1.09 million persons, but according to the 4th phase 5-year S&T development plan, it is anticipated that demand, in 1981, will practically double to 110,000 persons [S&T personnel], 150,000 persons [on-site technicians] and 1.7 million persons [technicians], respectively, for a total of 1.96 million persons. Furthermore, as far as long-range plans are concerned, in 1991, it is expected that the number of researchers needed will increase to about 10 times the present number. Therefore, it can be said that the problem of securing personnel is a serious and difficult one.

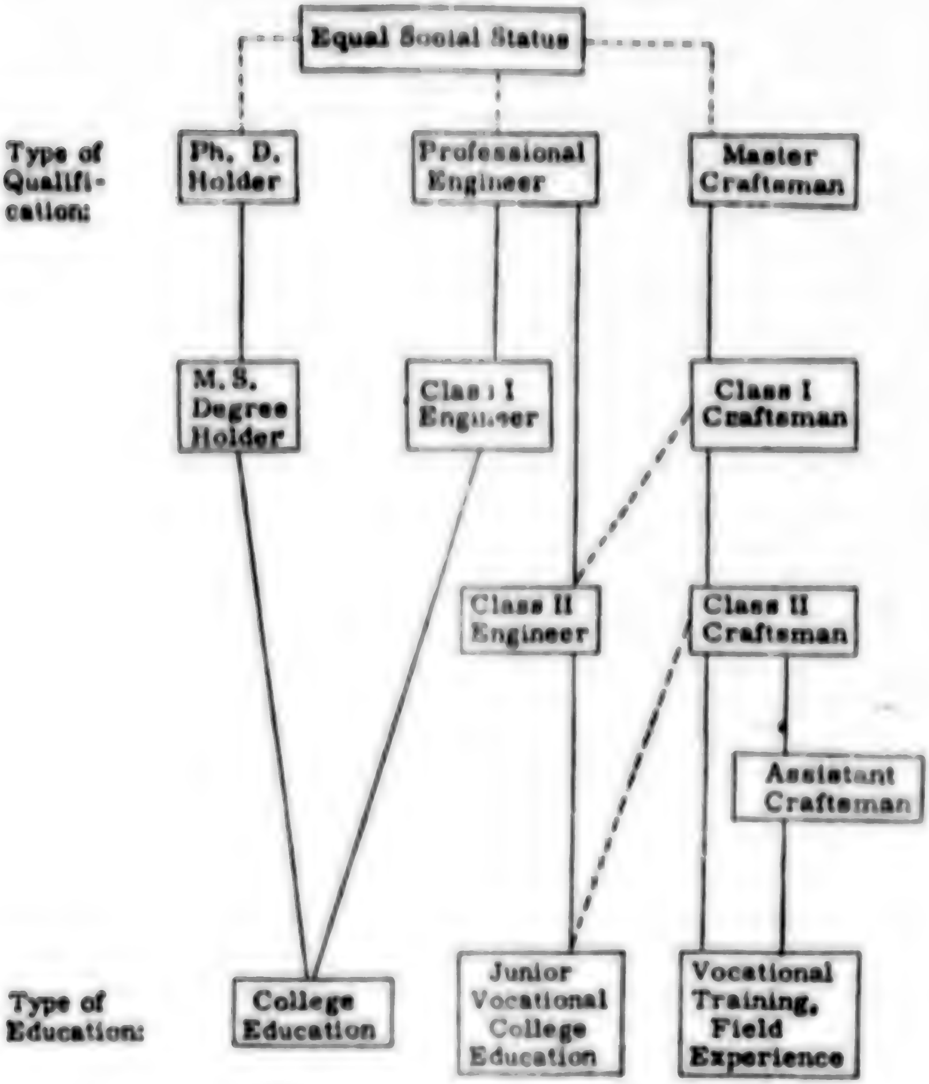
(1) The training of high-level S&T personnel is conducted with the KAIS as the nucleus and training staff is being gradually increased. However, to cope with the increased demand in the future, transfer to the Daeduk Science Town, establishment of auxiliary engineering universities, etc. are being considered in order to strengthen the training program.

(2) Training of technicians is being conducted according to the National Technical Qualifications System conforming to the National Technical Qualifications Law. The aim is to strengthen and improve the quality of education and training and to create a mood of respect for technology by giving favorable treatment to those who become qualified.

According to the technical qualifications system, the ideal social status of technicians is described below [Figure 2]. An Assistant Craftsman can become qualified as a Class I Craftsman through an examination procedure and it is reported that many 25- to 30-year old persons obtain the Class I qualifications.

[Figure 2]

Social Status of Technicians



The examination statistics are shown below [Table 7]. The agency responsibl for the examinations is the [Korean Technical Examination Corporation].

[Table 7]

[Examination Statistics]

Item	1977 Results Receiving Exams	 Percentage Passing	1978 Plans Anticipated Number to Receive Exams
Total	496 (thousand persons)	30%	577 (thous. persons)
Technical schools	73 "	45	110 " "
On-the-job training	11 "	75	45 " "
General public	412 "	24	422 " "

Preparations are moving forward to establish the Ch'angwon Technical University [Table 8]. The objective of the university is to train Master Craftsman with the highest qualifications to enable technicians to be respected socially. This university resembles Meister Schule of FRG. From 1979 students will be recruited.

[Table 8]

[Time Schedule of Ch'angwon University]

1977

Establish Technical University Law

Start of Ch'angwon Technical University (19 Nov)

Secure land site (Ch'angwon--22,500 tsubo [1 tsubo = 3.954 sq. yds.])

1978

Construction project (framework--1,000 tsubo)

Obtain required professors

Start instructions (FRG technical cooperation)

b. Promotion of Basic Science

Recently, efforts have been renewed to strengthen basic research activities. As a promotional agency, the Science Foundation was established in May 1977. The objectives of this foundation are to firm up the R&D basis in conformance with national development goals and to give priority support to cooperative researches among the various S&T fields and research organs. Also, the foundation will provide research grants to outstanding graduate school students or research assistants and promote a scientific cooperation and joint researches among the various nations.

The foundation started in 1977 with a capital fund of 1 billion won to assure execution of its operational plans. It concluded agreements of international cooperation with the U.S. National Science Foundation and the FRG Research Institute.

In 1978, the foundation doubled its capital fund by an increase of another 1 billion won and laid plans to carry out the basic functions of supporting research costs, providing scholarship grants, assisting research activities, etc. and to further promote cooperative agreements with various countries. As to future plans, during the 4th phase plan, the goal is to increase the capital fund to 26.7 billion won and plans are to obtain the money from the government, industrial circles and foreign aid. In research, the support of FRG, in particular, will be sought.

c. International Cooperation

Believing that S&T development will serve as a bridge toward closer diplomatic and economic cooperation, the country's basic goal is to enhance national prestige by strengthening scientific diplomacy through promoting domestic import of advanced S&T from abroad and increasing technological support to the developing countries.

(1) In technical cooperation with advanced countries, because of past heavy reliance on the United States and Japan, various West European countries will be particularly sought as cooperating partners. Also, as to the specific technical fields for cooperation, selection will be made after considering the special characteristics of the respective advanced countries. Furthermore, to strengthen scientific diplomacy, the country will aggressively participate in international organizations and conferences and strive for permanent cooperation with advanced industrial countries through concluding more S&T cooperative agreements.

(2) In cooperation with developing countries, the primary aim is to inform them of the ROK's developmental experiences and technologies through inviting trainees and dispatching experts abroad to provide technical guidance. Target countries are located in widely scattered areas, including Southeast Asia, Central South America, Middle East, Africa, etc. and plans are to increase the target areas. In inviting trainees, priority support will be given to those particular countries with underground resources, export capabilities and fishery resources.

As to the form of international cooperation, by working with an international organization, there can be a three-way technical tie-up and this method will be used more extensively. With the financial support of international organizations, the ROK experiences, systems and technologies can be exported and through this means, it is hoped that the ROK can advance economically and technologically and secure overseas resources.

d. Development of Industrial Technology

The ROK's basic aim in industrial technological development is to reach the level of advanced industrial countries in the 1980s. Now is the period to spurt ahead. To enable this forward surge, the current important policy tasks are to devise the strategy and to execute it.

As strategic tasks, the following three items are mentioned:

(a) To carry out a technological revolution with commercial enterprises in the leadership.

(b) To aggressively import and utilize advanced technologies and to attain an international level in technological capability.

(c) To expand national-scale, large research projects.

To carry out these tasks, the following program is being formulated:

(1) Establishment of research centers and specialized research organs. As mentioned previously, under the joint participation and support of government and industrial circles, specialized research organs in import industrial fields will be established. These organs will be located mainly in the Daeduk science town and made to serve as the nucleus in the technological development of chemo-heavy industries and think tank industries.

This science town will be set up in practically the center of the ROK, since industrial areas are widely scattered throughout the country, and the town is presently under construction.

(2) Promotion of technological development of non-governmental enterprises.

Concrete proposals to carry out this objective are as follows:

(a) Through formulation and execution of the Technical Development Promotion Law, provide incentives in financing and taxation. Also, promote research activities by establishing a technological development preparatory fund (143 enterprises, 15.8 billion won).

(b) To promote commercialization of new technologies, provide technological development loans at long-term low interest.

1976	14 enterprises	3 billion won
1977	31 "	5 " "

(c) Provide technological guidance to medium-scale enterprises.

1973- 977 103 enterprises 331 cases (according to the KIST)

(d) Promote large enterprises to set up their own research facilities.

(3) Encouragement of technological import

The status of technological import is shown as follows [Table 9 and Figure 3].

[Table 9]

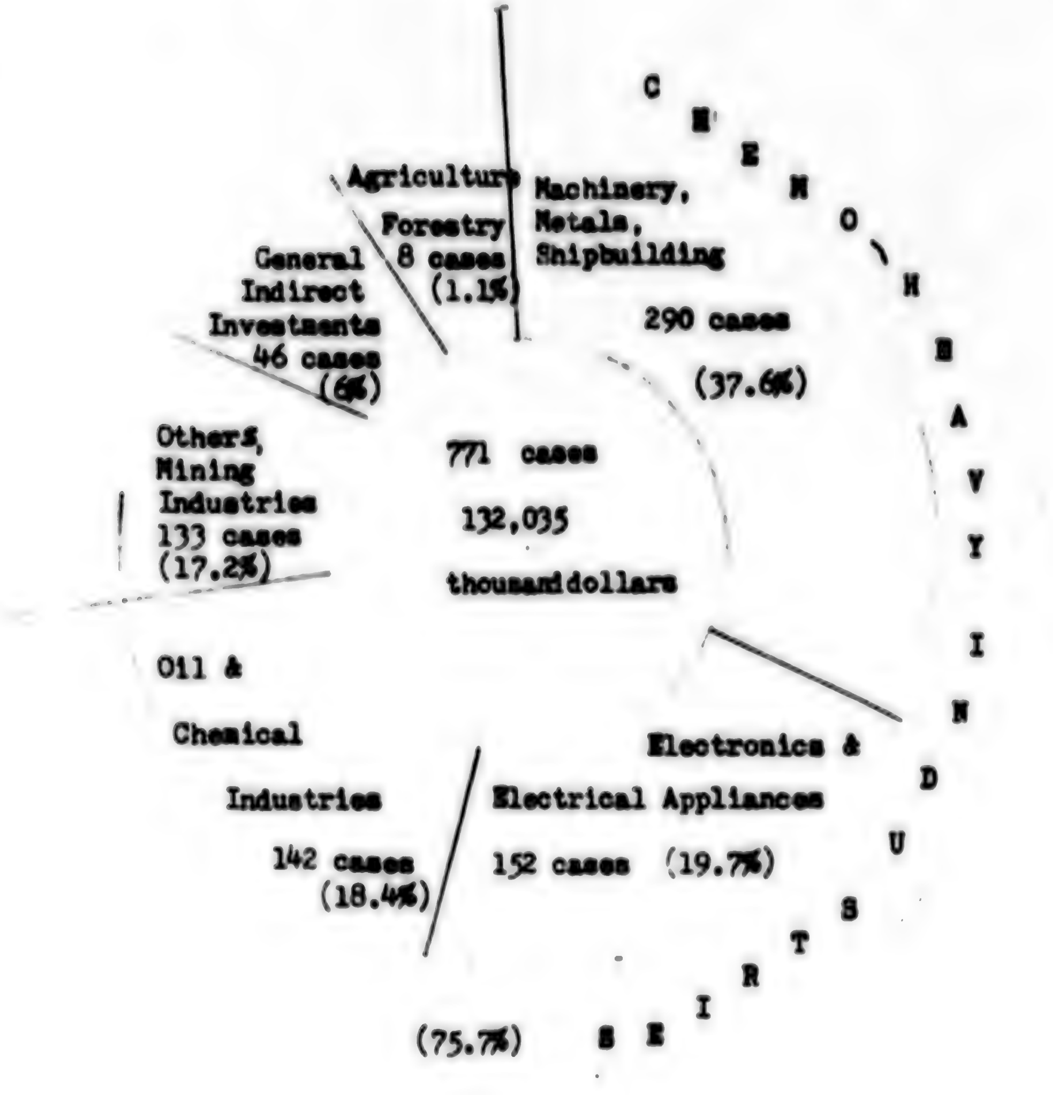
Status of Technological Import Permit by Country

Country / Year	U.S.	Japan	FRG	Others	Total
1962	3			2	5
1963	1			1	2
1964			1	-	1
1965	3		-	-	3
1966	5	10	2	-	17
1967	9	23	1	-	33
1968	13	32	1	3	49
1969	13	44	1	2	60
1970	18	60	1	3	82
1971	6	35	1	3	45
1972	11	32	3	3	49
1973	12	45	5	-	62
1974	14	56	2	8	80
1975	14	60	1	18	93
1976	24	63	5	17	109
Total	146	460	24	60	690

As basic policies, the principles of aggressive technological import and liberalization are followed. In other words, enterprises are directed to select the appropriate advance technology and increase their negotiating capability while carrying out liberalization in stages. Also, the policy is to promote stabilization of the imported technology and provide guidance to improve it.

[Figure 3.]

Status of Technological Imports (1962 - 1977)



Following are the concrete measures:

(a) Identifying and disseminating appropriate advanced technology. To accomplish this, gather the most recent technical information of various European countries and the United States and encourage diversification of countries from which imports are to be made.

(b) Move toward automatic permit system of technological import. With the technologies of chemo-heavy and export industries as the target, increase liberalization by stages for industries which satisfy a set of conditions as to prices and time period.

(c) Promoting the stabilization and improvement of imported technology. For this purpose, a "rotating fund" system is being studied. Through this system, financial support will be given to importation, assimilation and improvement of new technology as well as commercialization during the initial stages of development. Repayments will be made after the enterprise has become successful and negotiations are being conducted presently with the International Bank for Reconstruction and Development [IBRD] to secure funds.

e. Training of Utility and Construction Service Technology

The fundamental aim is to systematically train outstanding technicians and to develop efficient companies for utility and constructional services.

Concrete policies are as follows:

(1) Improvement of technical capability for utility and constructional service.

(a) By supplementing the Technical Service Training Law (1977), measures were taken to enlarge and specialize utility and construction service companies to enable package orders for construction of thermal power plants, to take tax exemptions (50 percent exemption of personal income and corporate taxes), etc.

(b) To train high-level technicians for utility and constructional service. A training course for technicians in utility and construction service was established in the KAIS (1977). In addition, under the United Nations Development Plan [UNDP], measures have been taken to undertake overseas training of needed technicians and to establish special courses to train draftsmen in the existing educational institutions.

(c) To develop chemical plants, general industrial plants, power plants, etc. into utility enterprises meeting international standards and scale and to support the federation of utility enterprises so that they can participate in large-scale projects overseas.

(d) To encourage the establishment of an industrial technology control organ, in an effort to expand export markets and increase international confidence, through quality control, products supervision, performance guarantee, etc.

II. Trends of Visited Agencies

A. Ministry of Science and Technology

As reported above.

B. Korea Institute of Science & Technology

Interviewee -- Han Sang-chun, director

The KIST was established as an independent contract research organ in 1966 in the research center in the outskirts of Seoul. Its organization as a juridical person was mentioned earlier but its special features as a contract research organ are described below.

It promotes rational and speedy R&D to obtain the maximum results at minimum costs. For example, to do this, researchers must become fully familiar with cost accounting. Cost per unit area has been set for laboratory space. As for personnel costs, how the staff time is to be allocated has been decided. Cost per unit time for use of experimental apparatus has been determined. Therefore, consideration must be given to minimum time requirement for research tasks. For this reason, if the research institute purchased an expensive large piece of equipment, unless fully productive results cost-wise can be estimated for its use, the research institute might turn down a job request.

In order to clearly calculate the abovementioned cost accounting and results, evaluations of researches are extremely detailed.

Enterprises entrusting researches to KIST are competing with other enterprises and the type of research being conducted must be kept confidential to protect the secrecy of the contracting enterprise. Therefore, the KIST researchers are legally required to keep secrets.

Through R&D in the fields of machineries, metals, chemicals, electricity, electronics, etc., the KIST has supported ROK's industrial technologies but upon examining research results, one notices that it has also done research under contract on food processing and other projects closely associated with the people's livelihood. It has been associated also with medium-small enterprises. Thus, an impression that one gets is that it is engaged in a variety of research activities.

As a contract research organ, the KIST is operationally very rational and strongly autonomous. On the other hand, however, since its activities rely upon contract research fees, the regular procurement of contracts becomes an important operational factor, and it appears that there were problems in the smooth running of professional research activities.

As mentioned earlier, the future policy is to create many specialized research organs which are to absorb and develop the KIST functions, and a mutual, complementary, joint research setup between the KIST and the other organs will become necessary. In that case, the KIST will probably become a composite research institute with emphasis placed on long-range, national-scale researches while the specialized research organs will place priority on seeking solutions to technical problems being faced by commercial enterprises.

The status of research contracts is shown below [Tables 10 and 11].

[Table 10]

Status of Research Contracts [Financial]

As of 31 December 1977
Unit: 1 million won
Number of cases ( )

Item Year	Total	Industries	Government Ministries	 Subsidies
Total	20,880 (1,780)	11,420 (1,025)	4,454 (367)	5,006 (388)
1967-1976	15,695 (1,528)	8,465 (877)	3,694 (323)	3,536 (328)
1977	5,185 (252)	2,955 (148)	760 (44)	1,470 (60)

[Table 11]

Status of Research Contracts [Types]

Type Item		Total	Machinery Metal	Chemical Processing	Electric Electronics	Food Living Subjects	Others
R&D	Number of Contracts	252	49	62	15	20	106
	Amount (1 mil. won)	5,185	968	1,155	415	218	2,429
Number of Completed Contracts		191	46	43	16	18	68

C. Korea Advanced Institute of Science [KAIS]

Interviewee -- Cho Sun-t'ak, chancellor

The KAIS was founded in 1971 and the first student enrollment took place in 1973. The objective of the institute was to increase, quantitatively and qualitatively, scientists and engineers who would be urgently needed to develop the ROK economy rapidly in the future.

The institute graduated the first group of students in 1975 and since then, approximately 150 have graduated annually as shown below [Table 12].

[Table 12]

Year	M.A.	Ph.D.
1975	92	-
1976	145	-
1977	139	-
1978	142	17

The present enrollment is as follows and plans are to gradually increase the enrolees:

1977 Status		1978 Plan	
Master's program	182	Master's program	222
Doctorate's program	17	Doctorate's program	50
Specialized Technician's program	56	Specialized Technician's program	118
Total	255	Total	390

Plans are to greatly increase the number of students but there seems to be financial problems. Students are exempted from tuition and militar duty and can receive financial aid. For this reason, after graduation, students must serve for a specified period of time in a domestic enterprise or an educational research institution. At present, about one-third of the graduates are employed, respectively, in government agencies, commercial enterprises or educational institutions. Demand from large enterprises has increased recently.

The KAIS setup is shown below [Figure 4].

There are approximately 60 full, associate and assistant professors and many earned their degrees in the United States.

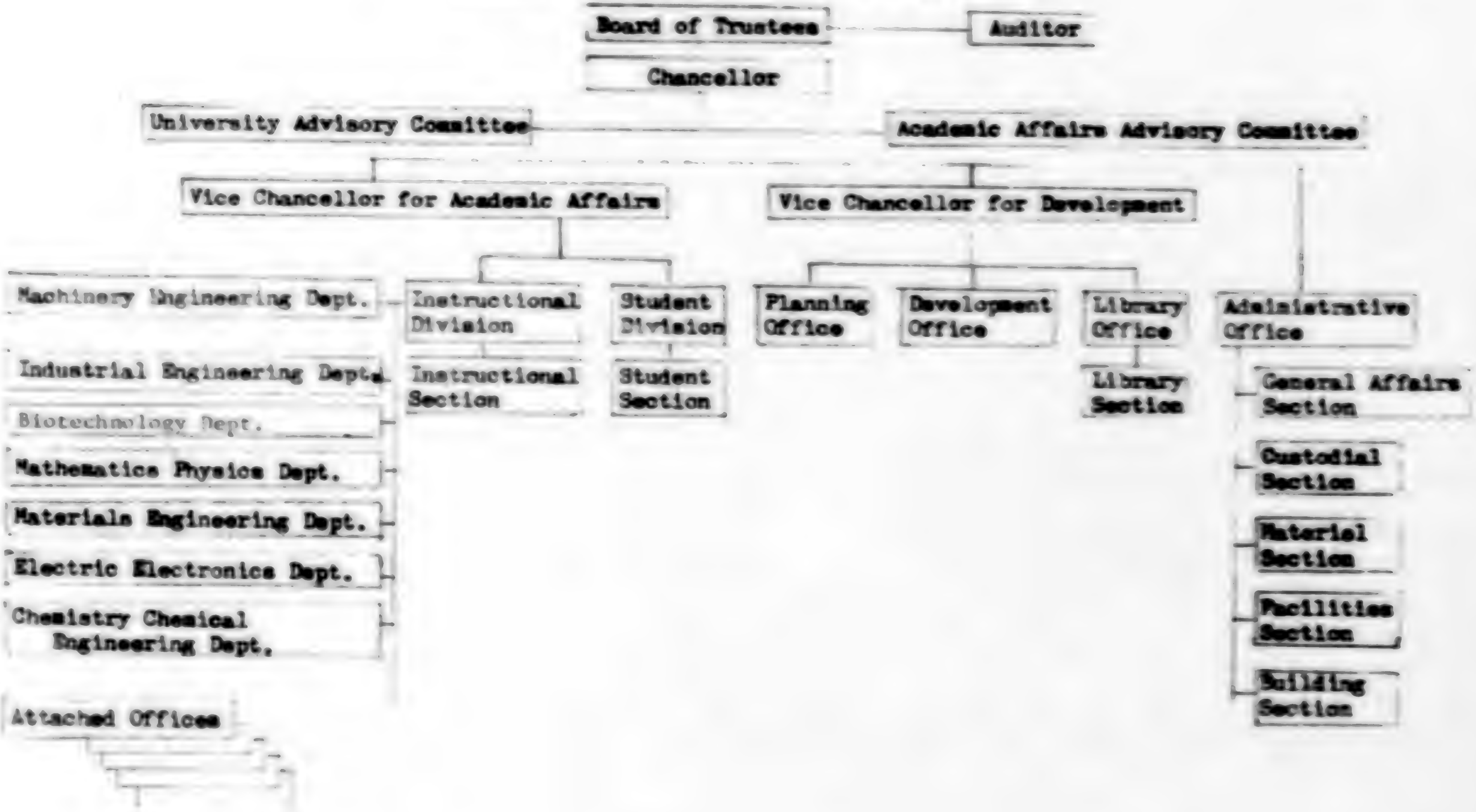
The Development Division receives contracts but only to the extent of taking up the overflow of the KIST, so the workload is small.

Two years ago the annual budget was approximately 3 million dollars but at present it is about 6 million dollars, and the ratio of roughly 20,000 dollars per student is very large when compared to other universities.

As for degrees, the Master of Arts program requires 2 years and another 3 to 5 years for the doctoral program. Students are permitted to select their own courses but doctoral program candidates are increasing. Since qualified personnel are scarce in the ROK, persons with doctorate's degrees receive preferential treatment. In 1977, a specialized technician's program was newly started.

Since many seek employment in non-governmental enterprises, there are more applying to study in the field of engineering than science.

[Figure 4. KAIS Organisational Chart]



With government and IBRD support, the KAIS plans to keep modernizing and increasing efficiency in the future.

For academic equipment and facilities, the KAIS received a loan of 6 million dollars through U.S. aid but because of the rapid expansion, it is planning to borrow another 12 million dollars from the IBRD.

As described above, the KAIS is a special educational institution blessed with very favorable circumstances, and effective results can be anticipated in the future for its experimental-type management.

D. Korea Scientific & Technological Information Center [KORSTIC]

Interviewee -- Kim Tu-hong, director general

1. Background

The KORSTIC was established in 1962 as part of the Korean Natonal Commission for UNESCO and became independent the following year, 1963, as a juridical foundation. This is the 16th year since its origin. Its founding was 5 years later than the Japan Information Center for Science & Technology [JICST] but its establishment as a central information center of a nation is comparatively early among the world's countries.

In 1964, it was placed under the jurisdiction of the Ministry of Education (comparable to Japan's Ministry of Education) and obtained government funds through the Ministry of Education, but in 1967 it became a juridical person under the MOST.

That year (1967), through the Japan-ROK Science Ministerial Conference, the KORSTIC signed a memorandum with the JICST and since then, both sides have maintained friendly relations. In 1967, Ch'oe Tong-rak became the first managing director. The following year, Yi Hu-rak became the managing director and has held the office to present. The building, located in the present Seoul research center, was constructed in 1969.

In 1971, reorganization took place and the office of director general war established. Kim Tu-hong became the first director general and has since held the position. In 1977, a new building was added to house information resources collection, reproduction facilities, printing equipment and computer facilities.

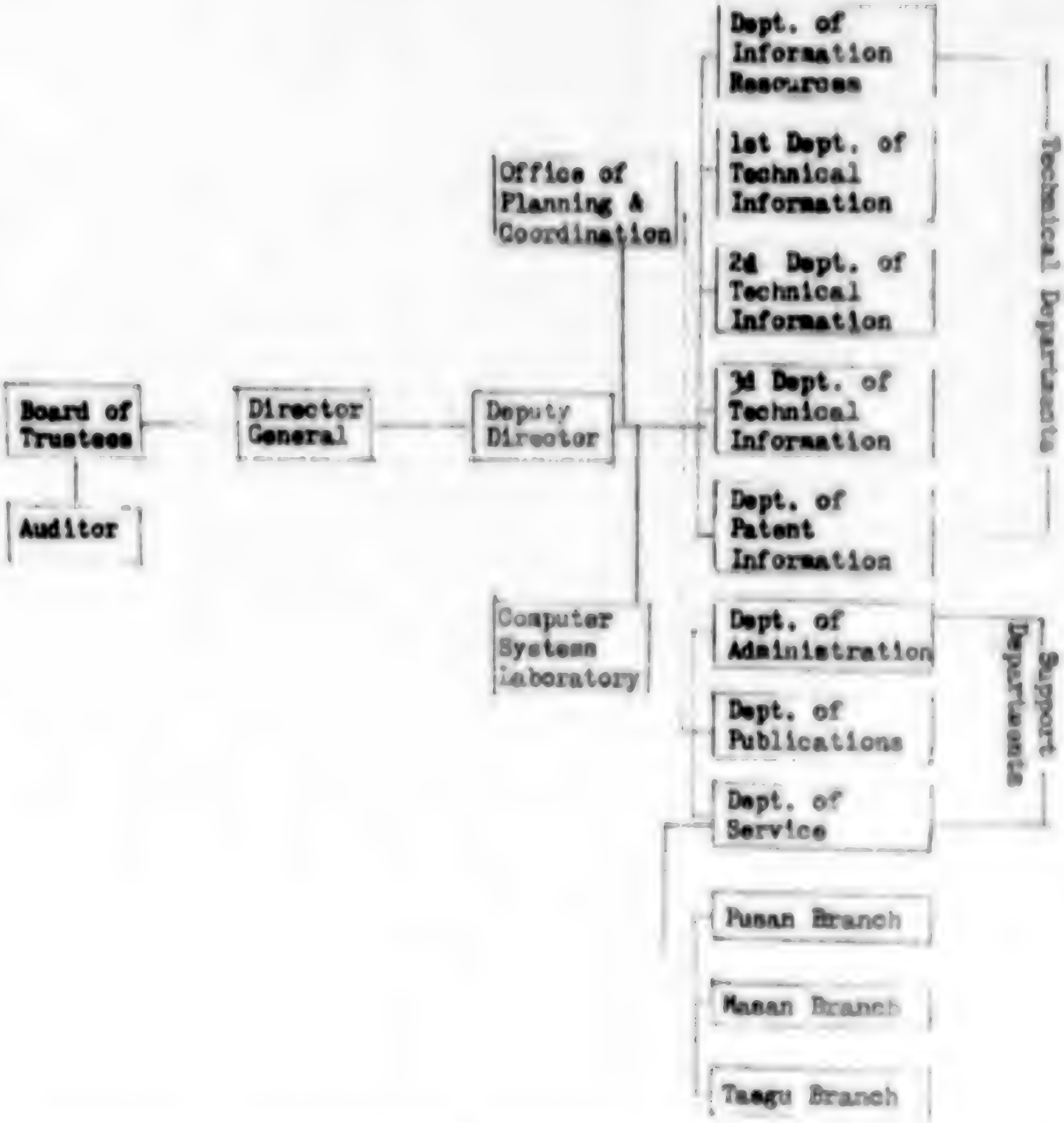
2. Management and Organization

It operates as a juridical foundation. As mentioned earlier, this legal entity is the same as that of the KIST and the KAIS which are located in the identical Seoul research center. The Board of Trustees, which is the top management organ, drafts project plans, formulates the budget through government requests or its own income, and supervises the execution of projects. The vice minister of Science & Technology is a member of the Board of Trustees and serves as a link between the MOST and the Board. The Board has immense power and can proceed to carry out project plans rapidly without going through the complicated procedure of obtaining government approval. The Board of Trustees is made up of 11 members.

The KORSTIC is organized as shown below [Figure 5].

[Figure 5]

[KORSTIC Organizational Chart]


Board of Trustees
Auditor
Director General
Deputy Director
Office of Planning & Coordination
Computer Systems Laboratory
Dept. of Information Resources
1st Dept. of Technical Information
2d Dept. of Technical Information
3d Dept. of Technical Information
Dept. of Patent Information
Technical Departments
Dept. of Administration
Dept. of Publications
Dept. of Service
Support Departments
Pusan Branch
Masan Branch
Taegu Branch

The Department of Technical Information [DTI] is divided into four units. The First DTI analyzes for users the contents of academic journals and technical reports such as on metallurgical engineering, machinery engineering, physics, construction engineering, shipbuilding engineering, etc. and edits the information into spot reports. The Second DTI is responsible for chemistry and chemical engineering, textile engineering, etc. while the Third DTI is responsible for biology, medicine, pharmaceuticals and agriculture-related fields. The Department of Patent Information is an offshoot of the Third DTI and became an independent unit in 1978. With the use of computers, it retrieves information and also collects information relevant to patents.

As compared with the JICST, the KORSTIC has a wider scope of operations and possesses the functional capabilities comparable to the Japan Patent Information Center (JAPATIC). As of 1978, the personnel numbered 209.

3. Objectives

To promote S&T, the KORSTIC serves as the central information center to provide the country's researchers and technicians with the world's S&T literature. It assumes the information service functions necessary to carry out the MOST's policies for striving for nation-wide efforts toward S&T development and to raise the ROK to the international level of an advanced industrial country during the 1980s. Furthermore, in recent years, the KORSTIC is not limiting its status to that of being its own country's focal point but striving to become the focal information point of the vast Asian and Oceania regions.

4. Main Functions

(1) Acquisitions and processing of information resources--5,000 academic journals acquired.

(2) Information processing--currently utilizing computer processing.

(3) Information dissemination--acting as technical consultants.

(4) International exchange of information.

(5) Dissemination of information control techniques.

5. Budget

For 1978--

Government funds expended	707,000 (thousand won)
Self-generated revenues	358,000 (" ")

Plans are to increase self-generated revenues to half of the total budget by 1980, to terminate government subsidies before the end of the 1980s and to become self-supporting in its operations.

Although self-supporting operations is the goal, government outlay occupies a proportionately large share of its budget both presently and in the past. This is reflected in the fact that the MOST relies most heavily on this agency to set up the S&T information dissemination system.

6. Operational Priorities and Future Plans

a. Increase publication of "specialized technical information journals by different industries."

The KORSTIC publishes specialized information journals by different industries and disseminates them to industrial associations or labor unions and is contributing particularly to the technical training of medium-small enterprises. This activity is part of the MOST's program to promote the technical development of non-governmental enterprises. As of 1977, 14 publications have been edited and published, by different industries, including "Pharmaceutical Technique," "Plastic Industry," "Communications Industry," etc. The aim is to increase the number of similar publication to 40 types by 1980. The KORSTIC claims that this setup of close ties with and information dissemination to industries has no parallel in the world and will become a model for the world's information service activities. As of 1977, the number of these specialized information journals published, per journal, was roughly 300 to 500 issues, although the number differs with each edition.

b. Increase computer literature information retrieval service.

Augment the information retrieval file of imported foreign literature. In July 1975, the KORSTIC purchased a microcomputer from Japan and began the computer literature information retrieval service. Presently, the following three foreign data files are being utilized.

CAC -- Chemical literature information file of the U.S. Chemical Abstract Service Co.

INSPEC -- Literature information file on physics, electricity and electronics, automation and automated control of the British Electrical Engineers' Association.

ISMEC -- Literature information file of the U.S. Mechanical Engineers. Plans are to increase from these three to 14 computer information retrieval data files by 1980.

Following are the main files being considered for import:

INPADOC -- International patent information file.

INIS -- International nuclear energy information file.

AGRIS -- International agricultural information file.

MEDLARS -- U.S. medical literature information file.

JICST -- Science and engineering literature information file.

In addition to the above, information services planned are KORSTIC-processed literature file and KORSTIC-processed retrieval file of research themes which are in progress in the ROK.

Also, on-line service is being planned with 1980-81 as the target period. Information on-line service is conducted at present in the ROK for the KIST library retrieval file, and terminals are placed in government agencies and main non-governmental enterprises. Today the development of information industry is one of the ROK government's important policies, and a preparatory plan for an information distribution system (called NASSTI and similar to Japan's NIST plan) is being considered.

The KORSTIC has a piece of equipment with the capability of computer input and output of the Korean language. This piece of equipment was imported from Japan, and unlike the KIST-developed system of mixing Hangul (Korean characters) for input/output, it is the type with the capability of separate input/-output of different characters.

c. Plans to construct computerized information service center in Daeduk Science Town.

In order to implement the program to provide the aforementioned 14 different types of computer information retrieval services, there is a plan to construct a computer center in the heart of Daeduk Science Town.

In carrying out the plan, information dissemination will not be restricted to the science town nor limited to researchers and technicians throughout the ROK, but it is believed that the plan is targeted against potential users throughout the vast Asian region. This is because the ROK's population is only about one-third of Japan's and in order to be self-supporting, users throughout a huge area must be serviced.

d. Publication of technical information analysis report.

From April 1978, publication of "Machinery Technical Information Analysis Report" is scheduled. This new publication has taken up the special theme of mechanical engineering and contains the analyses of expert researchers on certain subject fields such as, the status of ROK standards, the level of international standards, ways to open up domestic markets, pros and cons of technological imports, etc. An expert committee will select four or five themes each month. The necessity of this type of information analysis activity has been emphasized recently even by advanced countries, and the KORSTIC will be providing an example.

7. Promotion of International Cooperation

The "Scientific and Technical Policy Directions," published by the MOST, points out that the ROK will spurt upward to the level of advanced industrial countries in the 1980s, avoid limiting international cooperation to Japan and the United States but will seek interchanges widely with many countries, and also establish cooperative relationships with developing countries.

a. Promotion of friendly relations in Asian and Oceania regions.

In 1977, Director General Kim was selected as chairman of the Federation of International Documentation/Conference of Asean and Oceania Regions [FID/CAO]. In the same year, Chong T'ae-su, who has many years of experience with international agencies such as the UN Industrial Development Organization [UNIDO] was selected as the deputy director. The KORSTIC has taken up information activities in Asia and Oceania regions with deep interest. Stepped up actions can be anticipated in the future.

b. Exchange with JICST.

In late 1977, the 3d memorandum was signed for: (1) Personnel exchange; (2) publications exchange; and (3) technical guidance from the JICST on computerized literature information retrieval system.

c. Exchange agreement with India of translated materials.

In 1975, agreement to exchange translated materials was concluded with the India Science Documentation Center [INSDOC]. From India, Soviet documents translated into English were received while the KORSTIC provided Japanese documents translated into English and both sides are on a friendly basis.

d. Publication of Korean abstracts, in English, for use as international exchange materials.

In order to acquire materials, in exchange, from foreign countries, the KORSTIC has been publishing for many years, two types of document abstracts in English, namely, "Korean Scientific Abstracts," and "Korean Medical Abstracts."

E. Korea Research Institute of Ship & Ocean

Interviewee -- Choe Chang-hui, Deputy Director in charge of Special Projects

1. Establishment Steps

An Ocean Research Institute and a Ship Research Institute were established in 1973 as auxiliary organs of the KIST.

Both institutes were amalgamated in 1976 and established as a juridical person under the supervision of the Ministry of Commerce & Industry. The same status continues today.

It was placed under the Ministry of Commerce & Industry to obtain greater support from the industrial circles.

It was reported that decision has been made confidentially to again separate ship and ocean institutes and to revert the ocean research institute to the KIST.

2. The institute receives minimal support from the government in operational costs, facilities and experimental equipment. Surveys and researches are carried out on a contract basis.

Most of the contracts are received from the government but a portion comes from commercial companies and public corporations.

Feasibility studies constitute the core of the researches.

Research projects are as follows:

(1) Tidal power generation.

Feasibility studies are being conducted of eight potential sites on the west coast. A Canadian company has been invited to become a consultant. Basic designing is to be completed in 1979.

The contractor is the Korea Electric Co., Ltd. [KECO] and the contract sum is 150 million won.

(2) Survey of ocean pollution (contract from the Ministry of Health and Social Affairs).

(3) Basic research to develop inland waters (contract from the Office of Fisheries).

(4) Utilization of coastal space (basic ocean survey to expand the west coast).

As a future project, the institute would like to design facilities for tidal power generation. Research topics considered necessary include ecological study and environmental protection relative to national development, rational control of ocean resources and extraction of mineral products from ocean water. There are 55 persons in the ocean division and 50 in the ship division. Survey ships are presently being rented as needed, from the Fishery College and various commercial companies but plans are to build a ship under 100 tons before fall.

In international cooperation, the institute works closely with the CNEXO of France (sending students to study at the invitation of the French government). The institute is also planning closer cooperation with Japan such as to receive diving training at the Center for Marine Science & Technology, and to meet with coastal construction experts on tidal power generation, etc.

F. Central Meteorological Office [CMO]

Interviewee -- Yang In-ki

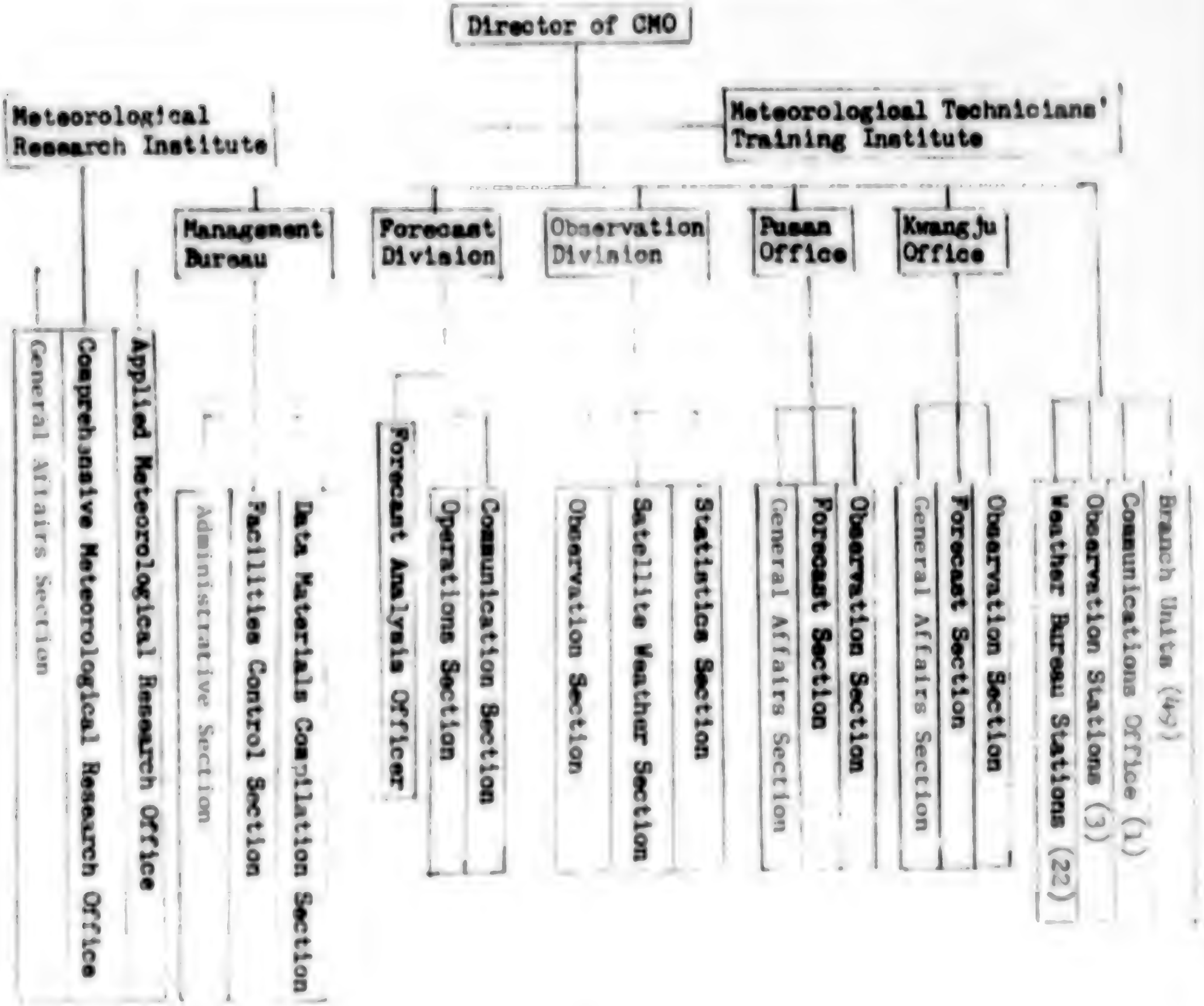
1. Background, Objectives and Status

The Central Meteorological Office, which is comparable to Japan's Meteorological Agency, is part of the MOST. Within the main offices are the meteorological operations division (forecast, observation and communications sections) and the research and survey division (survey statistics section, research officer) and in the outlying districts are the Pusan and Kwangju branch offices. In addition, under the direct jurisdiction of the CMO, there are the observation stations (radar, upper atmosphere and agricultural weather observation stations), meteorological technicians' training institute, etc. At the training school for meteorological technicians, 6 months to 1 year-training is given to those with high school level education.

In 1978, due to reorganization the setup will become as shown in the chart below [Figure 5]. In the reorganization plan, the research division will be strengthened. Plans call for the establishment of a meteorological research institute and a satellite weather section to receive communications from satellites such as Japan's stationary weather satellite (Himawari), etc.

[Figure 6]

[Organizational Chart of Central Meteorological Office]



The table of organization shows 461 technicians, 34 administrative personnel and 161 emergency duty workers, for a total of 664 (Japan's Meteorological Agency has approximately 6,500 employees).

The 1978 budget was 1,070 million won for personnel costs and 1,066 million won for operational costs, for a total of 2,136 million won.

2. Operational Status

The weather forecasting setup is practically the same as Japan's. There are forecast districts (districts where forecasts are announced) with CMO for the north, Pusan branch office for southeast and Kwangju for southwest. In addition, the Kimpo International Airport observation station puts out aeronautical weather forecasts. Weather charts are made of ground-level 850, 700, 500, 300 and 200 mb. The CMO also receives and uses in forecasts, radio broadcasts of the Japan Meteorological Agency of various types of weather charts, weather forecast charts, etc. Types of forecasts made are weather forecasts (forecast of 1 to 3 days), long-range forecasts (weekly and monthly forecasts), aeronautical forecasts (for domestic and international airlines) and special forecasts (warning and alert).

Among the main pieces of equipment and facilities are weather radar, orbital satellite receiving apparatus [automatic picture transmission--APT], wind tunnel, upper atmosphere observation equipment, facsimile, teletype, etc. As mentioned previously, the CMO is scheduled to import, in 1978, FAX receiving equipment for Japan's stationary weather satellite (Himaware).

The research division is conducting survey research on weather damages, industrial weather research such as moisture content for agriculture, etc., air pollution research, R&D of weather observation equipment, development of computer programming for meteorological work, research on special weather characteristics by area, etc.

3. Other

Since meteorological functions require special techniques, the CMO is handicapped by the lack of sufficient technicians. Technicians, in general, are snatched up by non-governmental enterprises where employment conditions are better. When importing new pieces of equipment, there is a need to first secure maintenance technicians and personnel who are well trained to operate the equipment. For example, the CMO director is strongly advocating that a system must be devised so that when importing new equipment, employees should be sent to a country such as Japan to acquire the technique and become experts. The CMO is considering personnel interchange with Japan's Meteorological Agency and is particularly anxious to have exchanges with the National Research Center for Disaster Prevention of the Science & Technology Agency.

G. Research Bureau [RB], Office of Rural Development [ORD]

Location -- Suwon city

Interviewees --	Kim Tong-su	Research Bureau Chief
	Ch'oe Tae-ung	RB Research Management Section Chief
	Ham Yong-su	Crop Experiment Station Chief
	Pae Song-ho	Grain Experiment Station Chief

Suwon city, in which the ORD is located, is about 40 km south of the capital, Seoul, and is a quiet city of scenic beauty where the Suwon castle still remains. On the shores of this city's Seoho Lake, a center of research institutes has been built and the Seoul University's Agricultural College, Crop Experiment Station, Livestock Experiment Station, etc. are located here.

The ORD is also a part of this center.

The ORD was established in 1957 as the Agricultural Research Institute which was reorganized into the ORD in 1962. Presently, the ORD is an outside organ of the Ministry of Agriculture & Fisheries and is responsible for operating the agricultural research stations and for providing technical guidance and education to farm villages.

1. Organization, Functions and Budget of RB

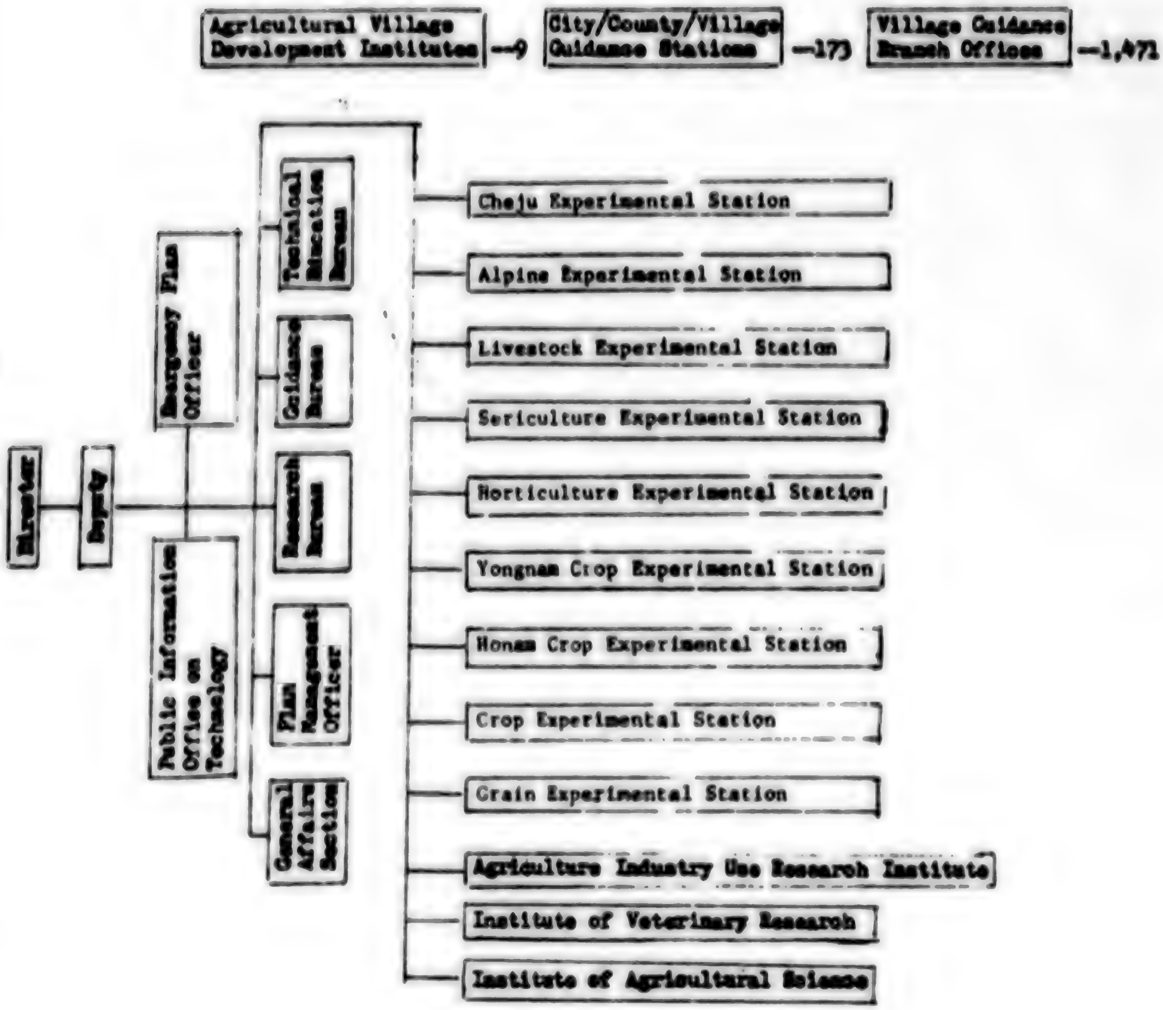
The ORD is comprised of the three bureaus of RB, Guidance Bureau and Technical Education Bureau and 12 national agricultural research institutes and experimental stations, as well as the provincial ORD's [Figure 7]. The RB formulates plans, effects coordination, etc. of all the research stations concerned with agriculture.

Under the RB chief are two research coordinators and two research officers. These officials, together with the three research coordinators of the Institute of Agricultural Science and Crop Experimental Station, are respectively responsible for the various apsects of planning and coordination of experimental stations. Under their supervision, there are the research management section and the research originating section. Of the RB's 37 employees, 33 are technicians who have research experiences in experimental stations, research institutes, etc. In addition to the RB, there are research personnel (532) in the central research and experiment organs, including the Institute of Agricultural Science, Crop Experimental Station, Agriculture Industry Use Research Institute, etc. There are also research personnel (252) attached to the provincial ORD's. A total of 820 research personnel are engaged in agricultural research.

The research costs of these stations amounted to 1,049 million won in 1971, 1,780 million won in 1975, 2,973 million won in 1977 (3,532 million won including personnel costs) and 3,439 million won in 1978 (5,400 million won including personnel costs). From the expenditures, it can be seen that the nation is aggressively investing in agriculture-related research stations which constitute the basis and motive power for agricultural promotion.

[Figure 7]

[Organizational Chart of Offi of Rural Development]


Agricultural Village Development Institutes
—9
City/County/Village Guidance Stations
—173
Village Guidance Branch Offices
—1,471
Director
Deputy
Emergency Plan Officer
Public Information Office on Technology
Technical Education Bureau
Guidance Bureau
Research Bureau
Plan Management Officer
General Affairs Section
Cheju Experimental Station
Alpine Experimental Station
Livestock Experimental Station
Sericulture Experimental Station
Horticulture Experimental Station
Yongnam Crop Experimental Station
Honam Crop Experimental Station
Crop Experimental Station
Grain Experimental Station
Agriculture Industry Use Research Institute
Institute of Veterinary Research
Institute of Agricultural Science

During the past year, a Grain Experimental Station was newly established to comply with the agricultural policy goal of becoming domestically self-sufficient in grain. To comply with administrative demands for agricultural research, bold steps are being taken to realign and expand the research setup.

2. Research Fields and Research Plans

In 1971, the ROK was 72 percent self-sufficient in food supply and 83 percent in rice needs. During that year, including 1 million tons of rice, a total of 3.13 million tons, or approximately 2.7 million dollars, of food supply were imported. Self-sufficiency in food supply will increase the income of farm families and satisfy the country's important agricultural policy. The third phase 5-year economic development plan, which began in 1972, lists "increase in main agricultural products and self-sufficiency in chief grain supply," as an important policy. The goal for a revolutionary development of agricultural and fishery economy coincided with the policy of the "saemaul" movement (directly translated as a "new village" movement) which began practically simultaneously as a nation-wide movement. It is said that during this period, agricultural production and agriculture-fishery economy showed remarkable advancements.

In view of this agricultural development background, in order to meet the agricultural policy goals, it is necessary to place the highest priority in strengthening the area of applied experimental research which is directly related to agricultural production. Even today, the program to promote research agencies is being continued with the focus on practical research which can directly influence agricultural measures.

In 1978, the ORD with the "continuation of the green revolution" as the goal, expounded the following policies: (1) Priority development of food resources; (2) technical innovation to increase income; (3) promotion of agricultural cooperatives; (4) strengthening training in agricultural techniques and training of youngsters; and (5) promotion of joint agriculture-industry-education efforts and international cooperation. The research organs are conforming to these policies and emphasizing the development and improvement of basic techniques which will promote these policies and help solve problems faced by the farmers. In the fourth phase 5-year economic development plan, the following 18 items are listed for agricultural research under the agricultural research project plan: (1) Develop new seeds which ripen speedily and produce abundantly; (2) develop techniques to safely cultivate and harvest crops; (3) increase arable space and improve planting system; (4) develop alternates to main crops and research on uses; (5) develop substitutes for enriched animal feed and improvement in raising technique; (6) improve productivity of livestock meat and disease prevention methods; (7) develop livestock products processing technique and promote their usage; (8) develop new types of cocoons and improve manpower-saving technique in raising; (9) develop new gardening products and improve cultivation methods; (10) develop mushroom fungus and improve culture technique; (11) develop products for industrial raw materials; (12) research on use of economical product processing; (13) soil survey and strengthening soil-enriching projects; (14) research on agricultural mechanization; (15) research on methane gas for fuel use in farm villages; (16) enlarge the scale of joint agriculture-industry-education endeavors; (17) increase exchange with international organs; and (18) study and strengthening of weak spots in the research field.

In the drafting, coordination, etc. of research plans, the RB received annually directions from the Ministry of Agriculture and Fisheries on the basic agricultural policies, and research requests from the agricultural administrative units. On the basis of these and other pieces of information, it prepares for the following year, "Agricultural Research Project Guideline Instructions."

This contains research guidelines which help satisfy government policies, and on the basis of these instructions, the various research stations draft the "Research Plan Outline." This research plan is taken up in the "Research Project Plan Conference" which is held annually in January, and the feasibility of goals, coordination of duplicatory researches, etc. are taken up and the project topics, plans, research budget, etc. are decided upon. The conference is divided into nine subcommittees, by different subject fields, and each is made up of research coordinators and officers of the RB, researchers from the central and provincial stations, university professors, responsible officials from the governmental administrative offices, etc.

Research evaluations are made at the "Research Project Evaluation Conference," which is held annually after the test period (December for summer crops and September for winter crops). The evaluation committee is identical in composition to the planning group. In the evaluation meetings, deliberations are held on the early release of outstanding research results and their use in administrative policies and projects which provide technical guidance.

On the basis of the evaluation group's deliberations, from among the research results, topics which should be taken up as administrative policies are considered by the policy group of the Ministry of Agriculture and Fisheries while technology which should be disseminated is considered first by the Technology Dissemination Bureau and then disseminated. For public dissemination of agricultural technology, the ORD has its own broadcasting and filming facilities and a printing center. Through broadcasts, films, research reports, technical guidance reports, agricultural information journals, etc., research results are passed on and guidance provided to the public immediately.

3. Raising the Quality of Researchers and Research Cooperation

The country puts great emphasis on the education of researchers and the import of new research information from abroad and is aggressively dispatching researchers overseas for training, sending representatives to international research conferences, etc.

In 1976, 100 researchers were sent overseas, and in view of the fact that the total number of researchers is 820, one can see the proportionately large number were sent overseas. Countries to which they were sent were primarily the United States, Japan, Philippines and Taiwan but other countries included West Germany, Thailand, United Kingdom, Australia, New Zealand, etc.

To Japan, as part of the Colombo plan or the Japan-ROK agricultural joint research project, 23 researchers were sent. To the United States, under the sponsorship of the U.S. Agency for International Development [AID], 19 researchers were sent. In addition, researchers are permanently stationed in such international organs as the IRRI, the CIMMY, etc.

There is an award system for research results, and each year the Agriculture & Fishery Research Award, Outstanding Research Agency Award, Outstanding Government Official Award, etc. are bestowed to research organs or researchers with outstanding research accomplishments, to boost the moral of researchers and stimulate research. Last year, to commemorate the topping of the increased rice production goal of 40 million koku [1 koku = 5.119 U.S. bushels], as part of the government program to attain self-sufficiency in food supply, a researcher who developed a new type of wet rice crop was decorated and a Presidential Commendation was awarded in a gala ceremony.

Foreign countries are actively providing assistance by sending researchers: AID on improvement of rice, wheat and different types of grain, primarily; West Germany on grassland; United Nations Development Program [UNDP], mainly France, on sickness and pests; and United Kingdom on agricultural machinery and technique of using methane gas. Vis-a-vis Japan, on the basis of the agreement concerning Japan-ROK agricultural joint research which was signed by both governments in 1974, joint researches are being conducted on seven topics, including the development of safe and productive types of main crops. Machinery and materiel are being imported; exchange of researchers and agriculture technical information are being conducted.

4. Crop Experimental Station and Grain Experimental Station

After visiting the RB, the Crop Experiment Station and the Grain Experiment Station were visited. The visit was short but it was possible to observe the types of researches being conducted, and the facilities, etc.

The Crop Experimental Station is an old experimental station that started in 1907. As the Crop Experimental Station since 1962, it has been the principal research organ on the cultivation of wet rice, farm produce, special crops, etc., research on the development of new seeds, etc. Especially in the cultivation of a new variety of wet rice, it developed the "Tongil" and the Tongil strain of wet rice which began to be used widely since 1971. It had a large yield and was disease resistant. There was a surprising increase in its planting and in 1976, occupied 44 percent of the planted acreage of wet rice. It is contributing greatly to self-sufficiency in domestic rice demand. One of the parent strains of this "Tongil" variety is the wet rice "IR-8," which was developed by the IRRI in the Philippines. The "Tongil" is an international hybrid which was developed through joint research by the Crop Experimental Station, Seoul University Agricultural College and the IRRI.

The Crop Experimental Station is headed by a chief and staffed by a research coordinator who supervises the management section, research officer in charge of developing wet rice variety, research officer in charge of wet rice cultivation, farm produce research officer, special products research officer and researchers. There are two other branches and field offices and of the staff of 68 members, 47 are actively engaged in research. In addition to research on wet rice, researches are being made on farm produce such as soybean, corn, sweet potato, etc., oil-yielding products such as rapeseed, sesame, hazel, etc., and textile fiber plants such as ramie, rush, flax, etc.

The Grain Experimental Station is a new office which was established only in May 1977. As for grain, self-supply is low and wheat, especially, is only 4.5 percent. There is almost total reliance on foreign imports and the agricultural policy objective is to become 50 percent self-sufficient. This station was established to strengthen the grain research setup. The station is comprised of the chief, management section, research officers in charge of wheat development and cultivation, barley research officer and researchers. Of the total of 44 persons, 31 are researchers. Because of similarities in weather and agricultural economic conditions, there is much in common between Japan and ROK in the problem of increasing grain production and other research tasks, and the need for joint research in the future has been pointed out. At present, one researcher from Japan's National Agricultural Research Station is in residence and doing joint research at this Grain Experimental Station.

H. The Industrial Advancement Administration [IAA]

Interviewee -- Kim Si-hyong, Planning Officer

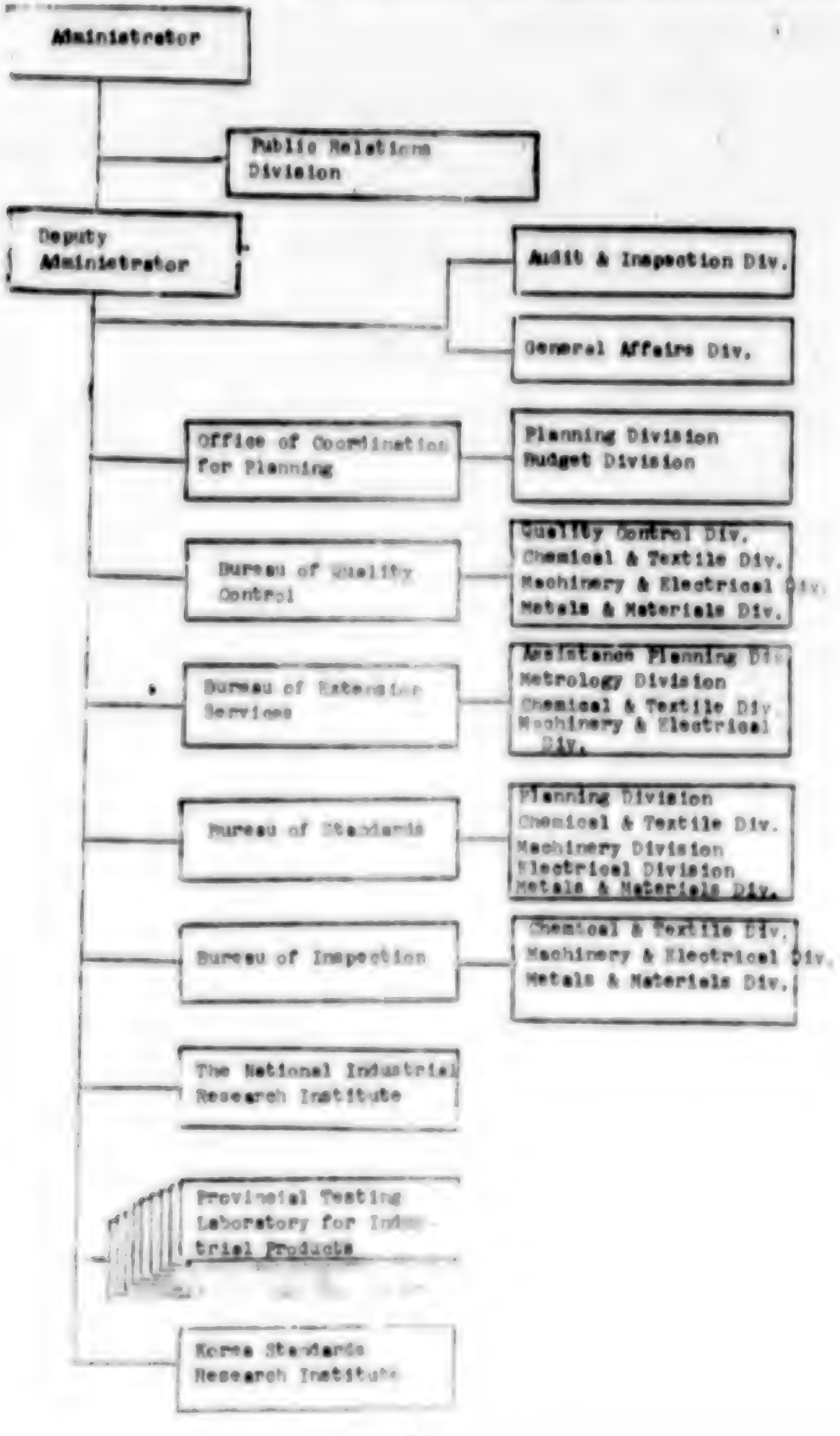
1. Background, Objectives and Status

a. To promote industrial development of the ROK, the IAA was established in January 1973 as a new national administrative agency attached to the Ministry of Commerce & Industry. When established, it absorbed the Bureau of Standards, Bureau of Weights & Measures, Mining Division of the Bureau of Mining, The National Mining Research Institute, and The National Industrial Research Institute of the Ministry of Commerce & Industry; The National Institute of Geological Survey of the MOST; and the Electric Power Division of the Telecommunication Research Institute of the Ministry of Communication.

b. The organization of the IAA [Figure 8] is presently as follows: 183 persons in the main office; 143 in the auxiliary organs of the National Industrial Research Institute [NIRI] and 198 persons in the Provincial Testing Laboratory for Industrial Products [PTLIP]; and the total number is 524. The 1978 budget was 3,924 million won for the main office, 1,528 million for the NIRI and 1,053 million won for the PTLIP, for a total of 6,505 million won.

Figure 8

[Organization Chart of the Industrial Advancement Administration]



2. Operational Activities

The main functions engaged in by the IAA are as follows: (1) Quality control of industrial products; (2) inspection and appraisal of industrial products; (3) industrial standardization project; (4) weights and measures control; (5) technical guidance; (6) safety control of industrial products; and (7) consumer protection functions.

3. Other

Industrial promotion functions, especially those related to technology, have been concentrated in the IAA, an external organ of the Ministry of Commerce & Industry, and the impression received was that the IAA was operating efficiently.

I. National Industrial Research Institute [NIRI]

Interviewee -- Hyon Won-tal

1. Background, Objectives and Status

a. It was established in 1883 as the first national research institute in the ROK. At the time, it was an analytical laboratory for metals, minerals, steel refining, fermentation, paper-making, etc.

It was renamed to Central Research Institute in 1912, reorganized as the Central Industrial Research Institute (six sections) of the Ministry of Commerce & Industry in 1945, renamed to National Industrial Research Institute (two divisions, six sections) in 1961, reorganized into the National Industrial Standards Research Institute (five divisions, one branch and 23 sections) in 1973, and it became the National Industrial Research Institute (six divisions, one branch and 27 sections) of the Office of Industrial Advancement, Ministry of Commerce & Industry in 1976.

In October 1977, the NIRI absorbed the PTLIP's (nine throughout the country) which had been under a provincial setup.

b. Its functions are as follows: (1) Development, research and survey of industrial technologies; (2) test, analysis and evaluation of raw materials for industrial products; (3) inspection and adjustments of measuring devices; (4) development and dissemination of testing and analyzing methods; (5) technical support (technical guidance, technicians' training and lectures on technology to medium-small enterprises); (6) training of technical skills for making pottery and porcelain; and (7) commerce and industry administration. Also, to conduct surveys and researches and to provide technical support necessary for industrial promotion.

c. Presently (January 1978), there are 143 regular government employees and 203 temporary employees (persons working in the institute on an annual contract basis), for a total of 346 persons. The 1978 budget was 1,383 million won. Estimates of income, for 1978, from inspection and research contracts from commercial sources amounted to 108 million won.

2. Operational Activities

Activities being conducted recently by the various divisions are as follows:

a. Organic Chemistry Division

(1) Technical development of organic medicines, test medicines, petro-chemical products, food processing, fermentation technology, dye processing, etc.

(2) Analyses, appraisals, tests, technical guidance, etc. of oils and fats, paper, leather, processed food products, textiles, thread, woven textiles, etc.

b. Inorganic Chemistry Division

(1) Technical development of test medicines, fire-resistant materials, abrasives, surface processing, anti-corrosives, etc.

(2) Analyses, tests and appraisals of inorganic raw materials, ceramic industry raw materials, etc.

(3) Technical guidance on industrial water use, waste water disposal, etc.

c. Machinery Metals Division

(1) Development of machinery elements, tools, machining skills, etc.

(2) Performance tests of precision machineries, automatic control devices, heating equipment, air conditioners and heaters, hydraulic machineries, transportation machineries, etc.

(3) Physical tests and anti-destructive tests, etc. of metallic materials.

d. Weight Inspection Division

(1) Performance and model tests of weighing and measuring instruments.

(2) Education, training and guidance of technicians engaged in weighing.

(3) Technical development of weighing and measuring methods.

e. Electricity and Electronics Division

(1) Development of domestic production techniques of electric and electronic products and electronic parts.

(2) Tests of electrical apparatus, electrical materials and electronic equipment.

f. Mining Technology Division

(1) Development of coal mining, ore mining and method of utilizing low grade ores.

(2) Technical guidance on deep shaft coal mining and mining safety techniques.

(3) Analyses, tests, appraisals, etc. of mineral ores.

g. Masan Ceramics & Porcelain Research Institute

(1) Inspections, tests, analyses and appraisals of ceramic and porcelain raw materials and products.

(2) Training of technical skills for making ceramics and porcelain wares.

3. Other

In cooperation with Japan's Agency of Industrial Science and Technology, joint researches are being conducted with the Nagoya Industrial Research Institute on ceramic industry raw materials (1973-1975) and with the Public Pollution Resources Research Institute regarding mining safety (1975-1977). The NIRI wants to expand the fields of joint researches. At present, activities are centered on analyses, tests and appraisals, but in the future, with the expansion of the ROK economy, the NIRI plans to become a national research institute capable of conducting its own advanced R&D.

J. Railroad Technical Research Institute [RTRI]

Interviewee -- Hong Chae-kak

1. Background, Objectives and Status

The RTRI was established in 1918 as a test laboratory of the Railroad Bureau's engineering section. In 1941, various research sections such as materiel, soil characteristics, electricity and fuel were formed and the RTRI became Comprehensive Research Institute. In 1949, it was called the Transportation Technical Research Institute and in 1963, it became the present RTRI. In 1970, the research and test sections were abolished and the research officer system was adopted.

The RTRI is under the Office of National Railroads and conducts survey and R&D on general skills needed to maintain transportation safety in railroad operations and R&D on railroad items.

In 1977, there were 15 persons in the management division and 34 in the research division, for a total of 49 persons. The 1977 budget was 91,754 thousand won for personnel costs, 15,610 thousand won for general ope. expenses, 35,571 thousand won for research costs, for a total of 142,395 thousand won. Personnel costs account for about 64 percent of the total, and research costs about 25 percent.

Under the institute chief are the management division (15 persons), physics and chemistry researchers (9), rolling stock researchers (9), electrical researchers (8) and railway researchers (8). The physics and chemistry researchers conduct inspections and researches on the performances of paint, rubber, plastics, etc. used for rolling stock, etc.

2. Operational Activities

The main research topics for 1977 are listed below to give a picture of the institute's operational activities.

a. Research on increasing safety in railway traveling (R&D is in progress on new braking equipment to prevent accidents of freight car derailments).

b. Research on strengthening railway construction (by measuring rail stress and pressure on roadbeds, obtain information to improve railway construction and repair methods).

c. Research on safety of bridge construction (inspect and measure the safety requirements of bridge piers and examine methods of measuring vibration resistance of dangerous bridge piers, means of reinforcement, and speed limits of running trains).

d. Research on engineering means to reinforce weak roadbeds (conduct research on means of improving roadbeds by examining cracks, freezing and soil characteristics).

e. Development of electrical equipment for rolling stock (developmental research for domestic production of main rectifiers and research to improve battery rechargers).

In addition to above, developmental research for domestic production of rolling stock parts, research on prevention of cracks by heat in the wheels, research on quality improvement of rolling stock parts, etc. are being conducted. The budget is from 2 to 4 million won for each research item.

Many of the researches are investigative in nature and researches directly related to safety of the railroad industry and researches for domestic production of equipment are noticeable. There are no advanced R&D-type researches such as to develop new types of equipment or design experimental products, etc.

3. Other

Many of the important ROK research institutes are juridical foundations but the RTRI is a government research organ. It cannot be said, however, that because of that, the RTRI is in a better position regarding personnel and budget, vis-a-vis, the juridical foundation research institutes. The ROK government has placed the highest priority on industrial promotion but the amount being spent for research on transportation safety is small. Therefore, the research scale can be said to be limited. However, the ROK government is beginning to show interest in transportation safety and can be expected to give its cooperation to the research aspect.

According to the chief, the RTRI is interested in cooperating with the Institute for Technical Research of Railways of Japan but interest lies in research on snow avalanches and roadbeds, and the topics differ somewhat from Japan's area of concern. Furthermore, in the ROK, although trains run at slow speed, there are many accidents, and research to solve this problem is also necessary. It appears that there is full recognition of the importance of the RTRI but since railroads also run in the "red" in the ROK, research cannot be pursued satisfactorily.

K. Seoul National University, College of Engineering

Interviewee -- Yi Ch'ae-song, dean

In 1946, with the public announcement of the founding of the Seoul National University, the former Keijo Imperial University's Science and Engineering Department, Keijo Engineering College and Keijo Mining College were all abolished and 15 colleges were united into this new College of Engineering. The Seoul National University has a new campus and most of the facilities have moved there but the College of Engineering still remains at the former location and is scheduled to move to the new campus next year.

There are 16 courses at the College of Engineering and the number of students formally enrolled in courses are about 2,800. Except for the machinery designing course, the other 14 have Master of Arts degree programs. Of the 14, except for the ceramic engineering and industrial engineering courses, the other 12 have doctoral degree programs. However, it seems that there are very few graduate students. As for faculty, there are 56 professors, 55 associate and assistant professors, and 25 assistant instructors (helpers), for a total of 136 members. In addition, about 60 graduate students participate in the teaching. However, the faculty is very small. The small number of assistant instructors (professors' assistants) is particularly noticeable, but it is reported that an increase in number has been requested. The table of organization calls for a total of 140 full, associate and assistant professors but the slots have not been all filled. This tendency was seen at the KAIS, and the lack of personnel seems to be a common problem. To effectively carry out the educational program, scholars, particularly of Korean ancestry, are invited from the United States to serve alternately. The college desires to have 90 of them over a period of 5 years. Instructors are also sent for training to the United States. Presently, 22 are in the United States and 17 have completed training and returned. This program is part of the plan to strengthen graduate education with the 7 million dollars obtained through the AID loan which was set up in 1975 and government subsidy.

With the rapid progress in industrialization plans, the ROK Government is emphasizing the training of technicians and researchers but the MOST is the nucleus of the promotional program, and the Seoul National University's

College of Engineering is handicapped in facilities and funds. Therefore, the no-strings-attached 2 billion yen grant from Japan which enabled the modernization and addition of educational facilities was highly praised. It was also said that with further help, an ideal facility can be built.

Including personnel costs, the education budget is about 1 billion won. To conduct research on the theory and application of production techniques, an auxiliary Production Technique Research Institute was established in 1976. With the instructors as the backbone, academic research is being conducted here. In 1977, research costs amounted to 280 million won, but 57 percent of this total came from commercial enterprises as contract researches. Of the research budget, the Ministry of Education and the MOST provide 16 to 17 percent, respectively, and the remainder comes from non-governmental foundations.

As stated above, with the plans for rapid industrialization, the ROK government is taking determined steps to tackle the problems of R&D and personnel training. However, in the long run, it is believed that steady progress toward a well-rounded educational program is impossible. As for the university system, the various national universities follow the policy of specialization and select their fields of specialties. That the industrial training course, which had been taught at Seoul National University, was transferred to Chungnam University, is an example of this specialization policy. It is hoped that, in the future, through various measures, the universities will gradually perfect their educational and research programs.

L. Daeduk [Taedok] Science Town

As mentioned earlier, to concentrate R&D activities in one area and to contribute effectively to the development of chemo-heavy industries, the Daeduk science town is under construction 200 km south of Seoul. Construction was started in 1973 in accordance with the Specific Research Institutes Promotion Law. The first phase will be up to 1978 and approximately 100 billion won will be spent, while during the 2d phase, which is up to 1985, between 100 to 150 billion won will be spent to complete the project. The total acreage of this science town is about 27 km square. There will be research and educational facilities, parks, living quarters and other public facilities. Up till now, the Korea Research Institute of Ship and Ocean, the Korea Standard Research Institute, etc. have been built. Before 1985, the KAIS, the Food Research Institute, etc. are scheduled to be transferred here. Not only will research organs be transferred here but commercial enterprises in general are being invited and the establishment of a university is being considered. The aim is to build a think tank city of 50,000 persons. The construction of research organs, etc. is the responsibility of each concerned ministry and the MOST is responsible for overall coordination. The primary functions of the science town are:

(1) Assume the role of medium for R&D.

(2) Advance R&D activities.

(3) Training of technicians and supplying of data.

(4) Technical guidance to commercial enterprises.

(5) Import and dissemination of overseas technologies.

This science town will assume the role of S&T center in the ROK. Research organs which are scheduled to be moved here before completion are shown in the following charts [Figures 9 and 10].

[Figure 9]

Research Organs, Etc. Scheduled to be Transferred Before 1977

Unit: 1,000$

Classification Research Institutes	Land Area(Km^2) Procurement	Personnel (Achievement)	Investment Domestic fund	Investment Foreign fund	Total Investment	Remark
Korea Standard Research Institute	0.61 (0.59)	320 (90)	6,804	11,000	17,804	Ministry of Commerce and Industry
Korea Research Institute of Ship and Ocean	0.42 (0.26)	320 (125)	12,577	8,400	20,977	"
Korea Chemical Research Institute	0.48 (0.30)	300 (26)	4,123	3,000	7,123	"
Korea Nuclear Fuel Development Institute	0.97 (0.64)	442 (186)	21,237	31,000	52,237	Ministry of Science and Technology
Korea Telecommunication Research Institute	0.97	105 (87)	2,061	1,000	3,061	Ministry of communication
Choongnam-University	1.10 (0.90)		12,344	5,800	18,144	Ministry of Education

[Figure 10]

Research Organs, Etc. Scheduled to be Transferred Before 1981

Research Institutes	Land area (Km^2)	Construction period	Remarks
Korea Energy Conservation and Monitoring Institute	0.178	'77 - '81	Ministry of Commerce and Industry
Central Research Institute for the office of Monopoly	0.060	'78 - '81	Ministry of Finance
National Tax Research Institute	0.030	'78 - '80	"
Food Research Institute	0.090	'78 - '81	Ministry of Agriculture and Fisheries
Material Development Center affiliated with KIST	0.270	'78 - '81	Ministry of Science and Technology
Korea Institute of Geoscience and Mineral Resources	0.421	'79 - '81	"
Korea Advanced Institute of Science	0.972	'79 - '81	"

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